OCT (OPTICAL COHERENCE TOMOGRAPHY) IN OPHTHALMOLOGY

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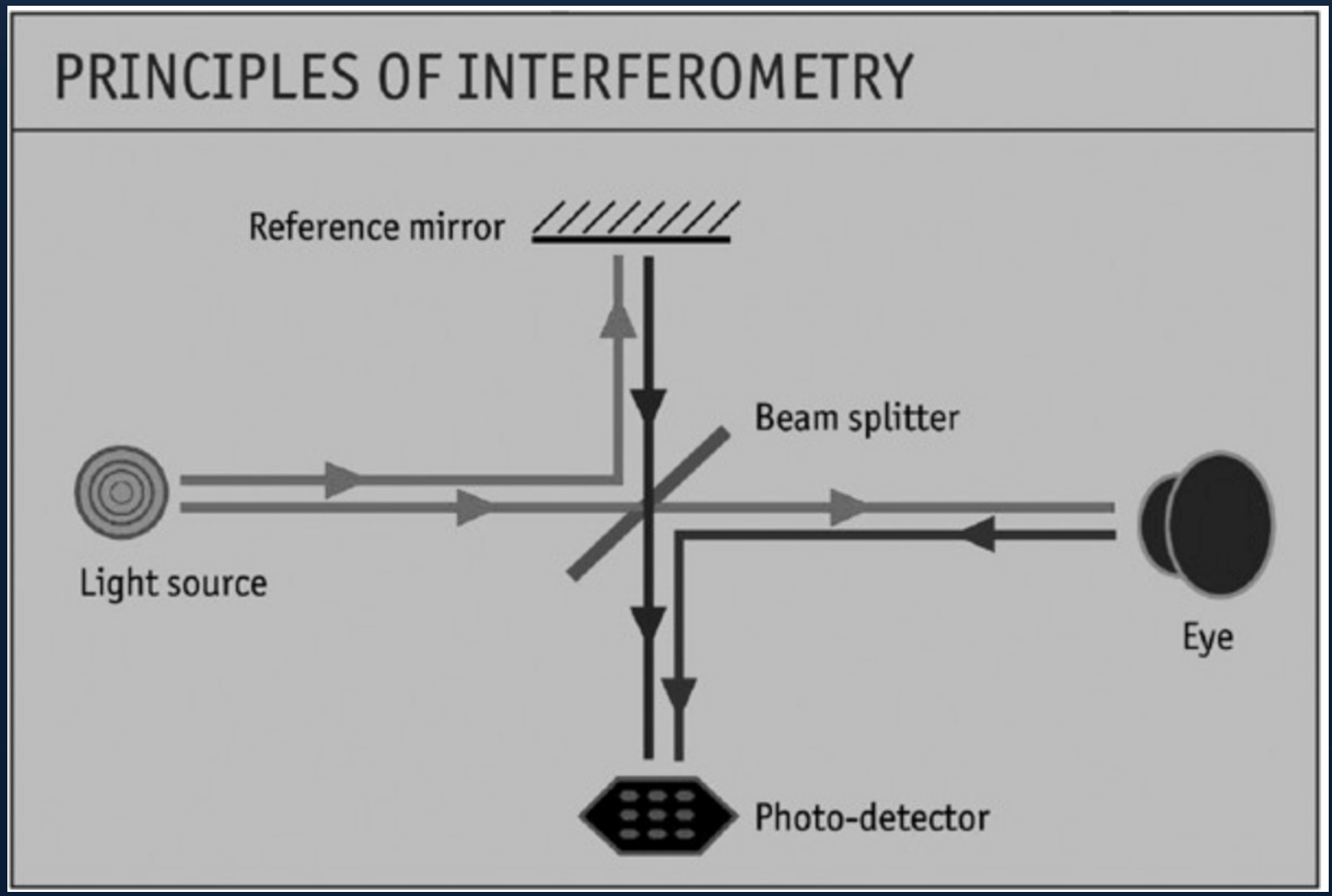
OUTLINE

- Tips for assessing Macular OCT
- Typical OCT features in Retinal Diseases – What to Refer and When to Refer
- Other OCTs (Disc/ Anterior Segment)

PRINCIPLE OF OCT

- Based on the principle of Low Coherence interferometry



ASSESSMENT OF MACULAR OCT

Basic tips includes

- Pay attention to the scan quality
- Use proper language
- Familiarise with the Anatomy
- Assessment of Subfield analysis

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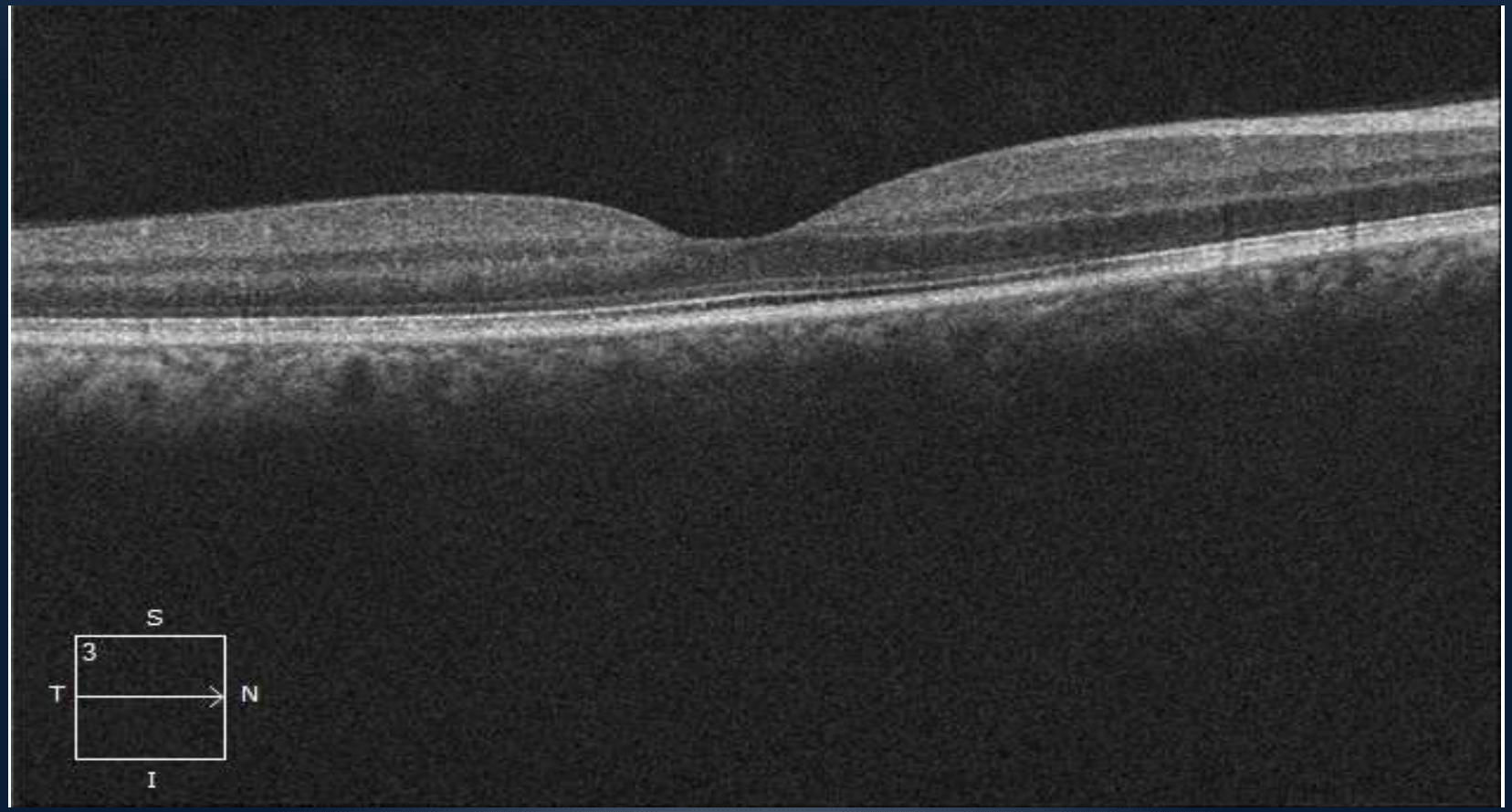
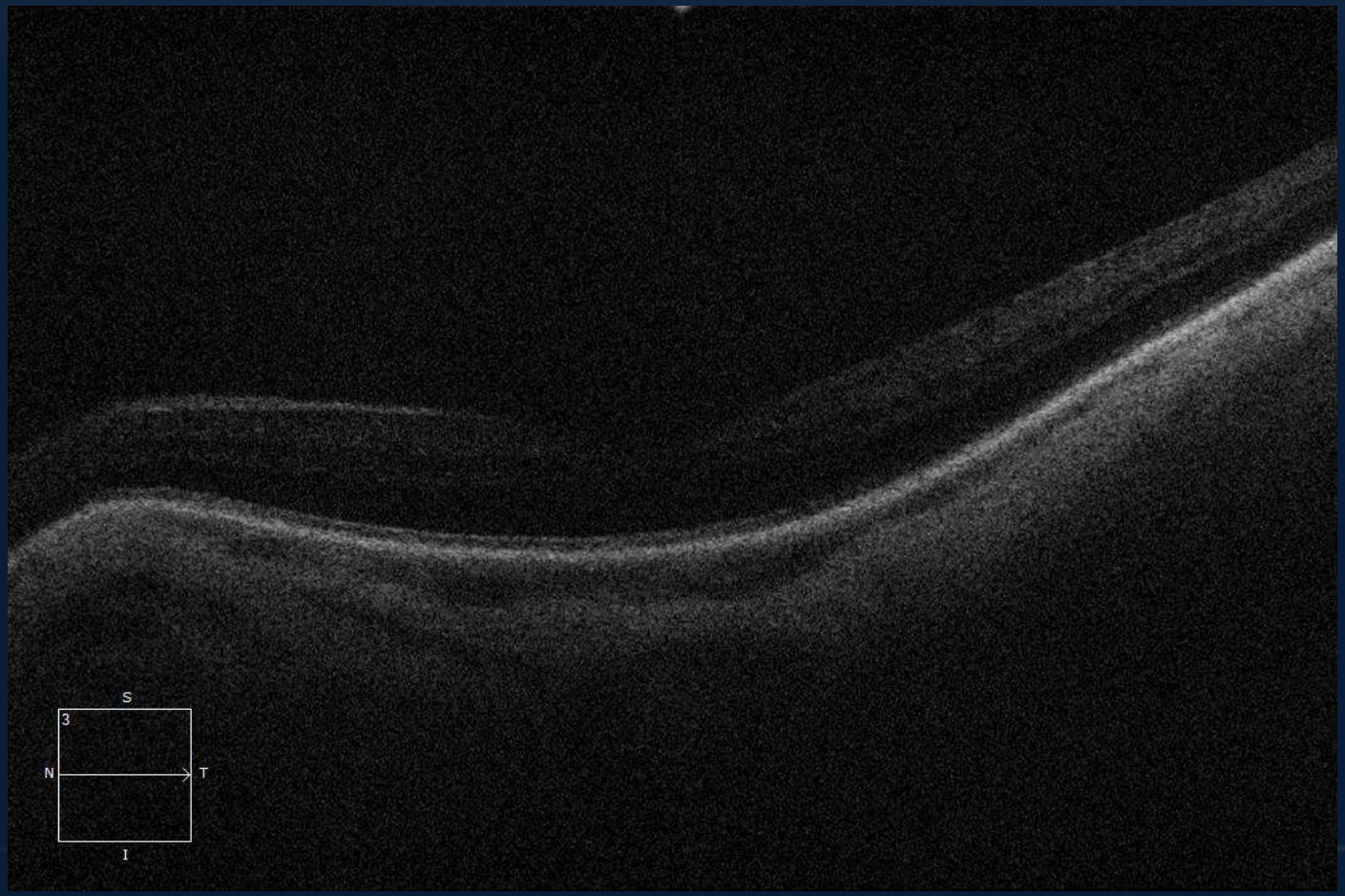
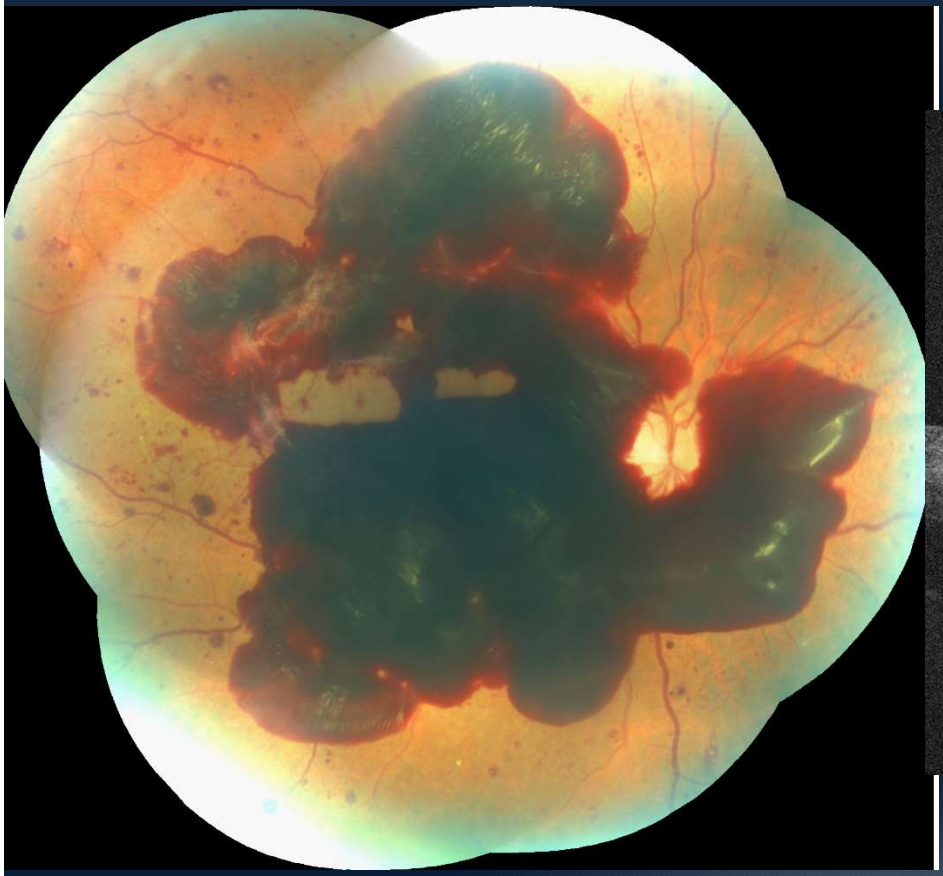
GOOD QUALITY SCAN

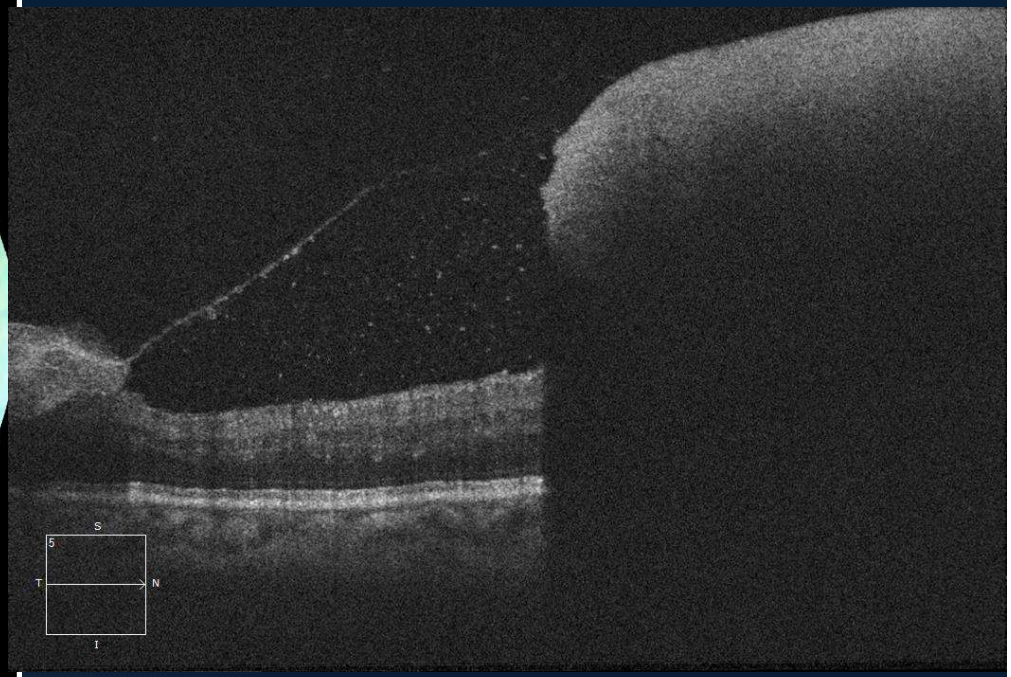


CATARACT CAUSING POOR QUALITY OF THE SCAN

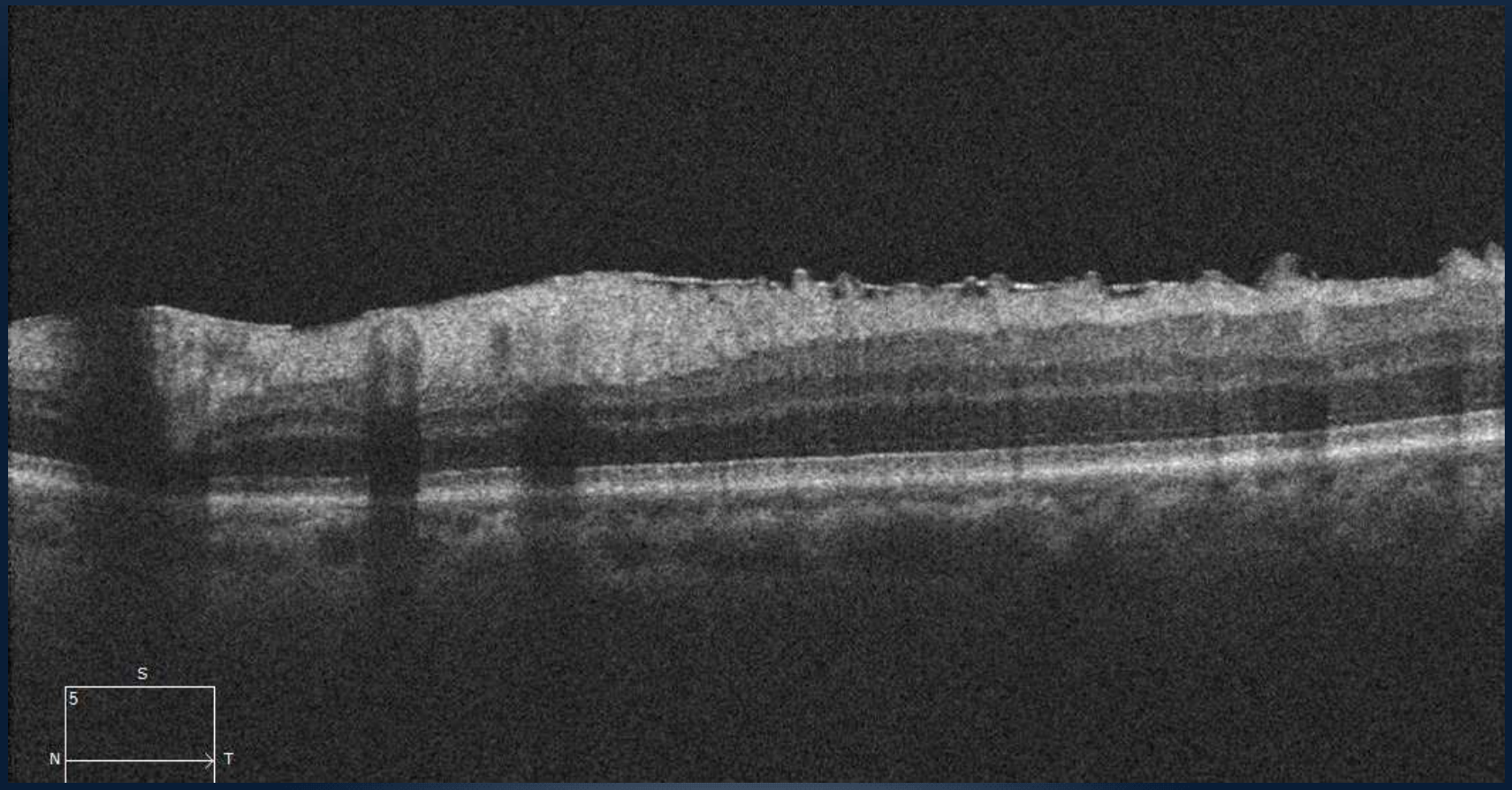


OTHER MEDIA OPACITIES

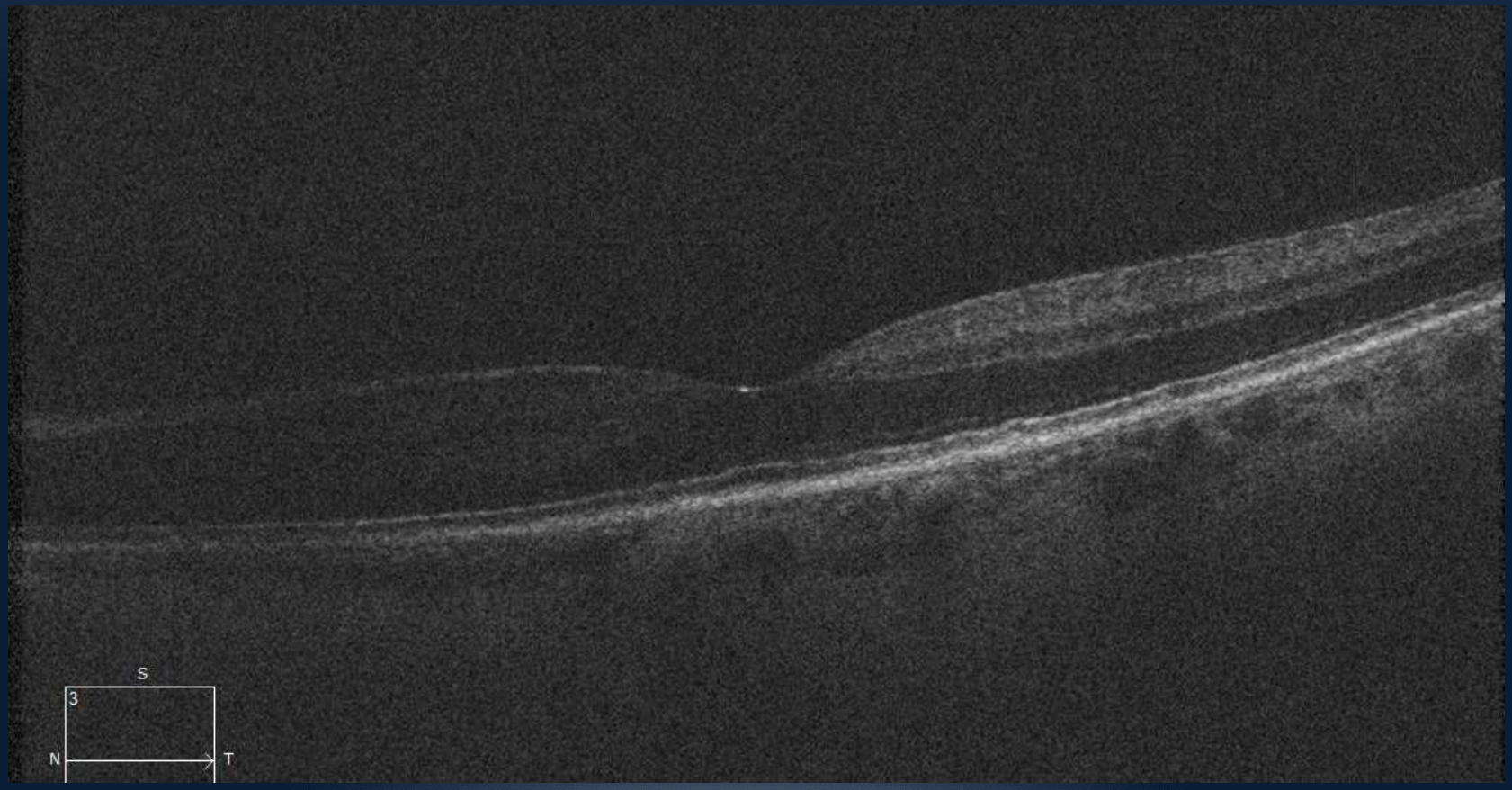




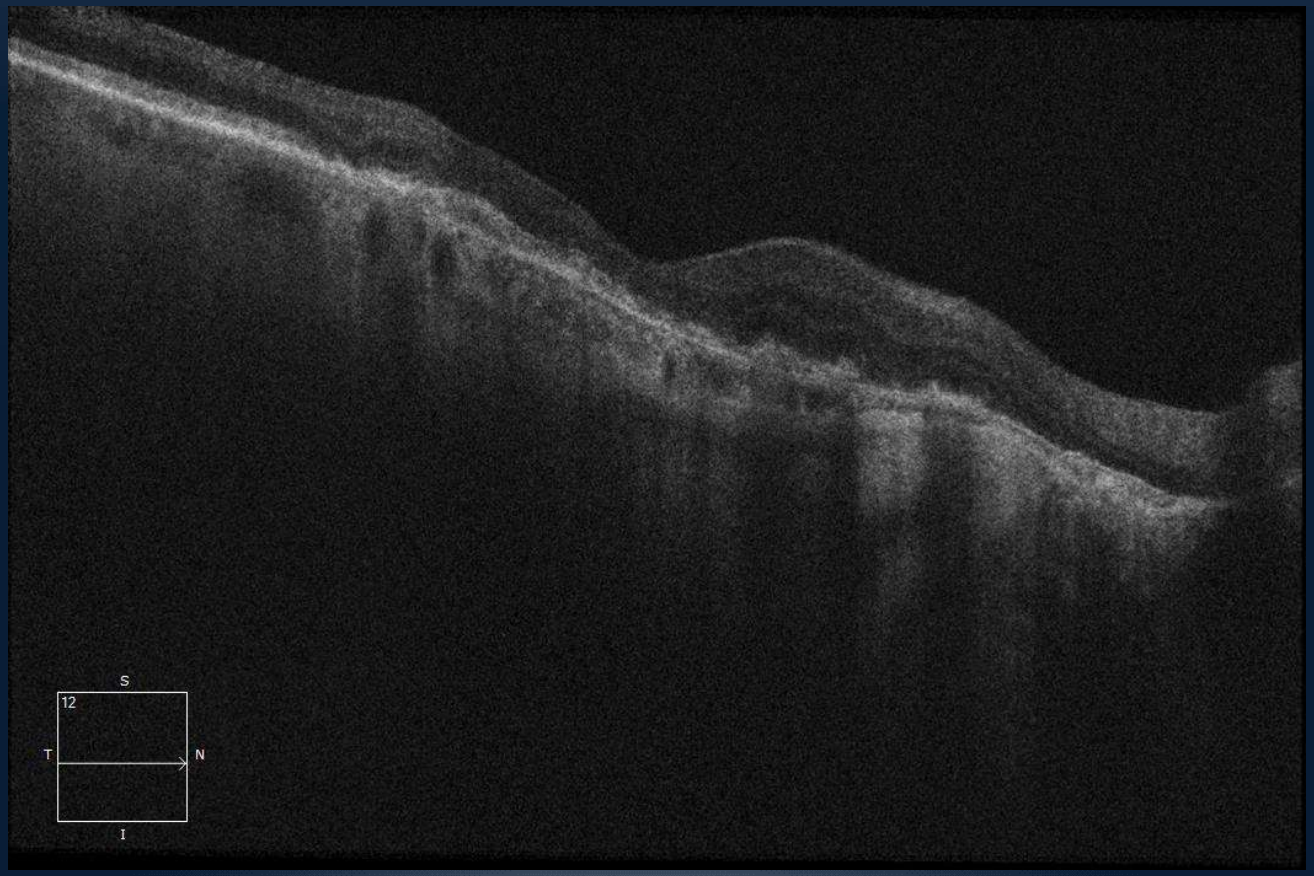
SHADOWS (WEISS RING)



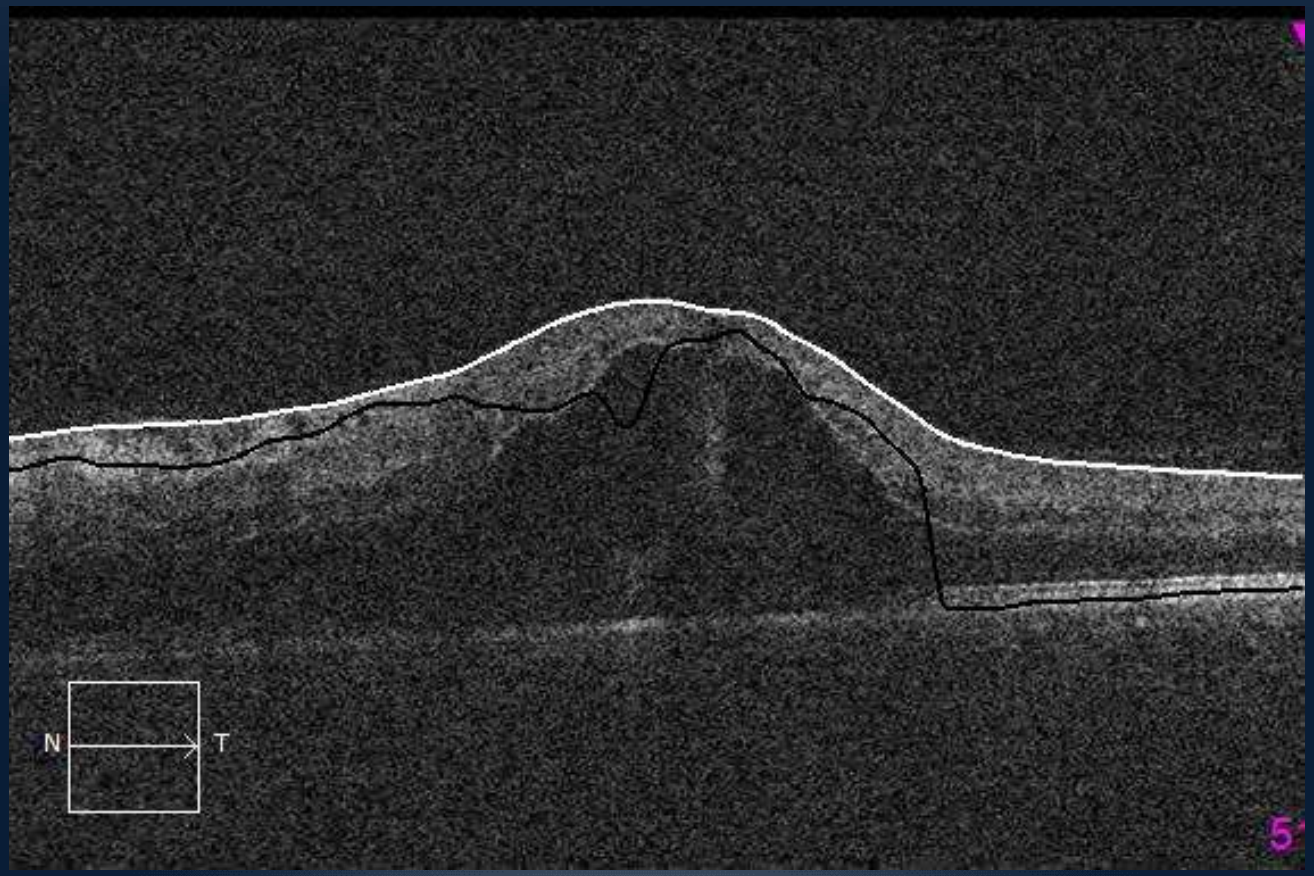
SCAN QUALITY - VIGNETTING



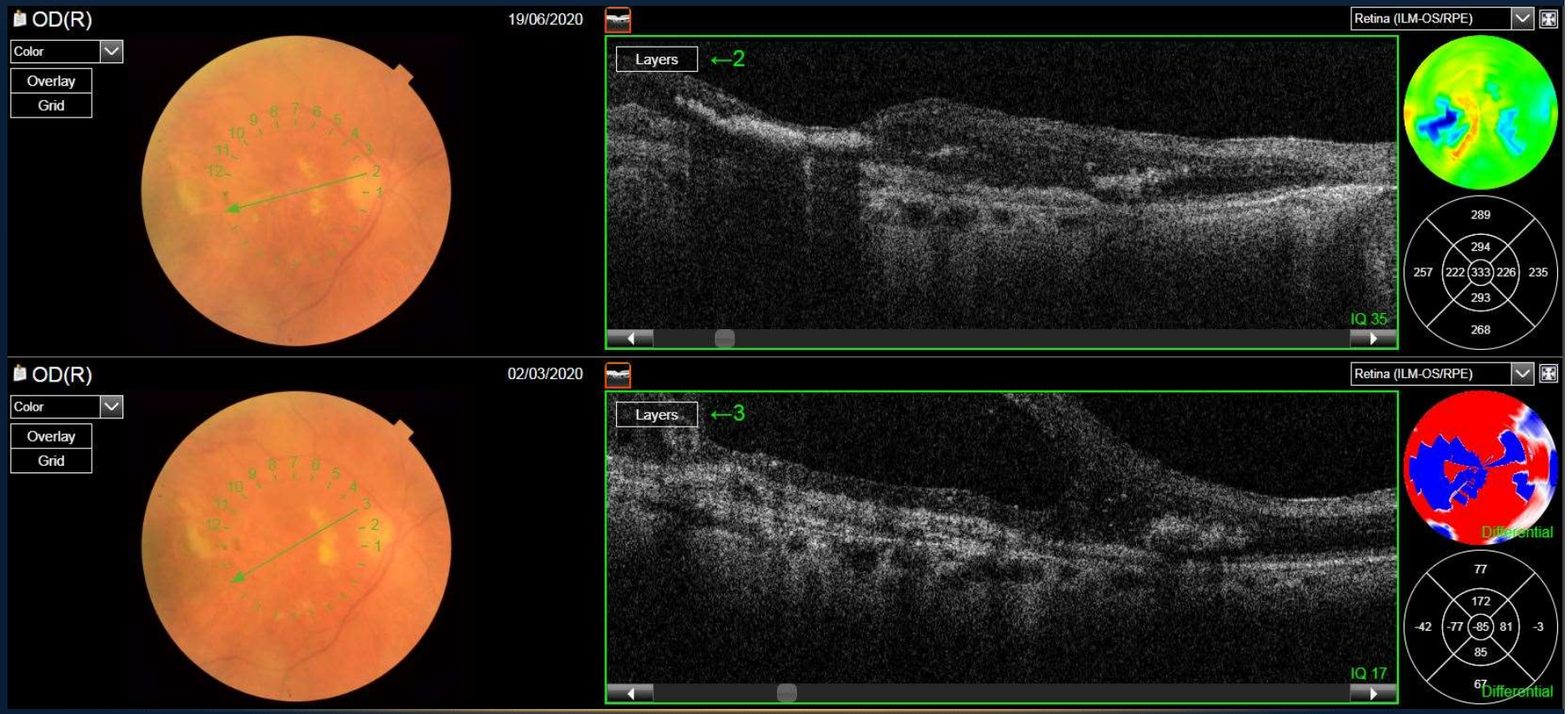
SCAN QUALITY - OUT OF RANGE ERROR



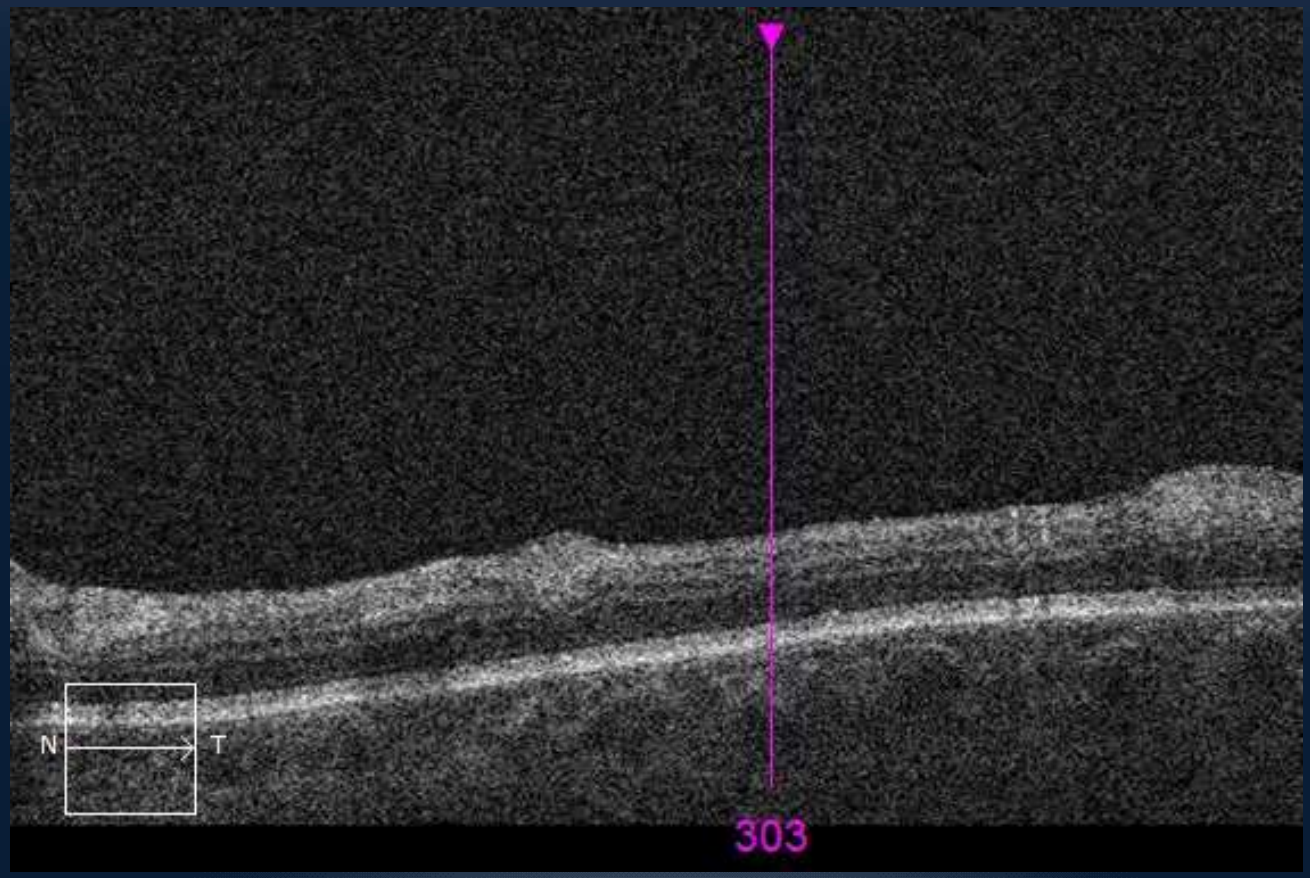
SCAN QUALITY - SOFTWARE BREAKDOWN (INABILITY TO ASSESS THE RPE)



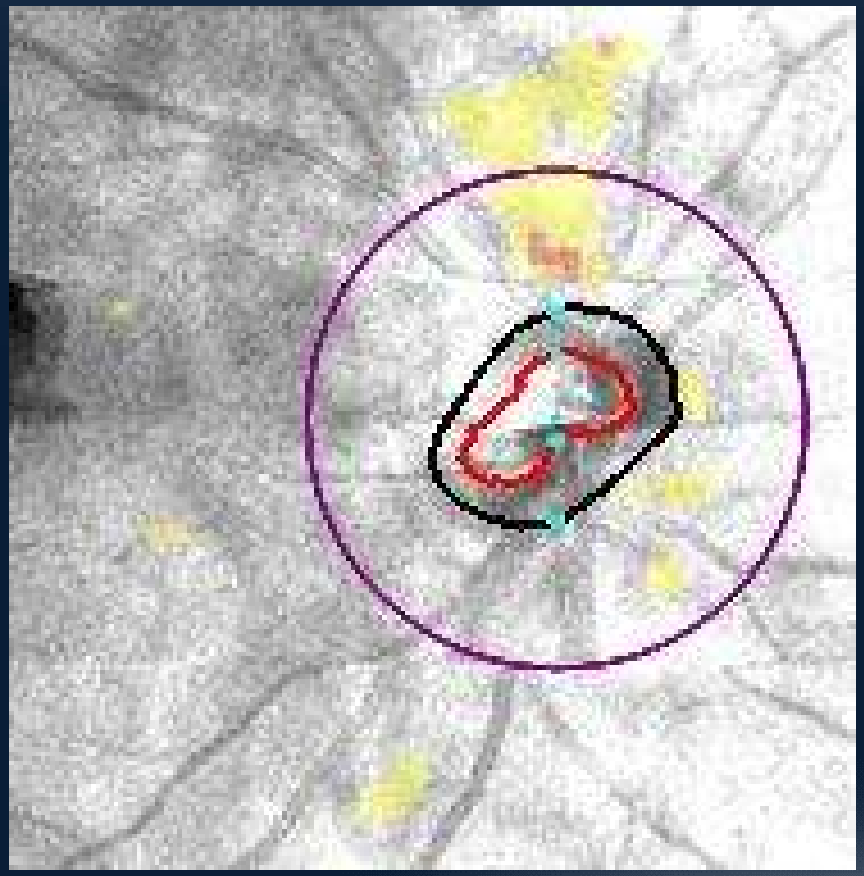
SCAN QUALITY - OUT OF RANGE ERROR & ALSO SOFTWARE BREAKDOWN

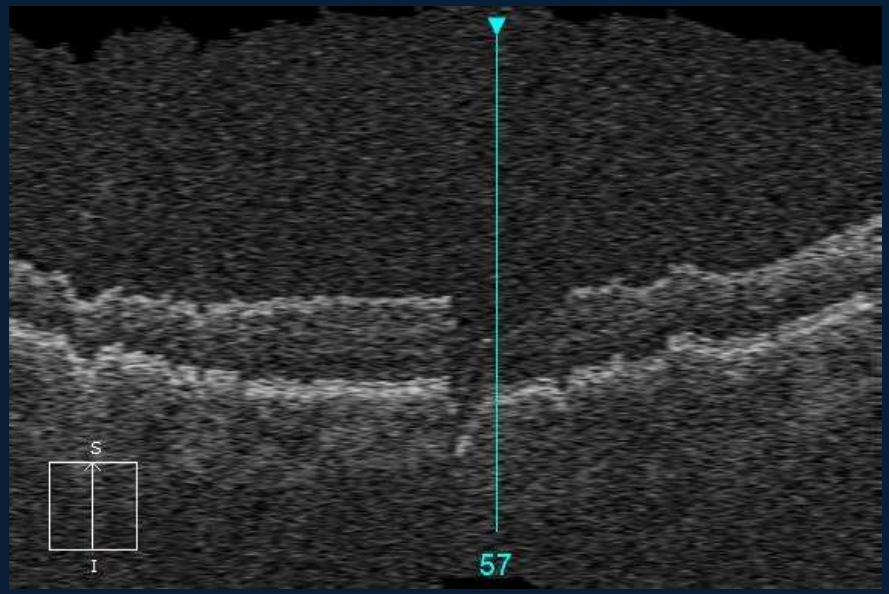


SCAN QUALITY - MISALIGNMENT

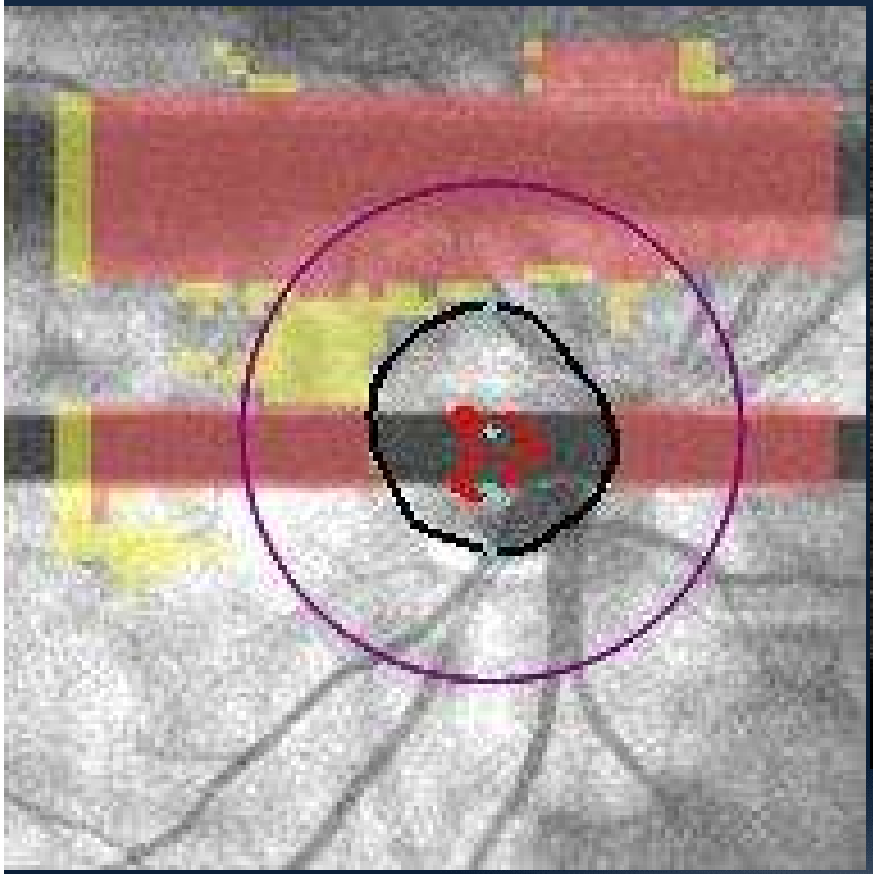


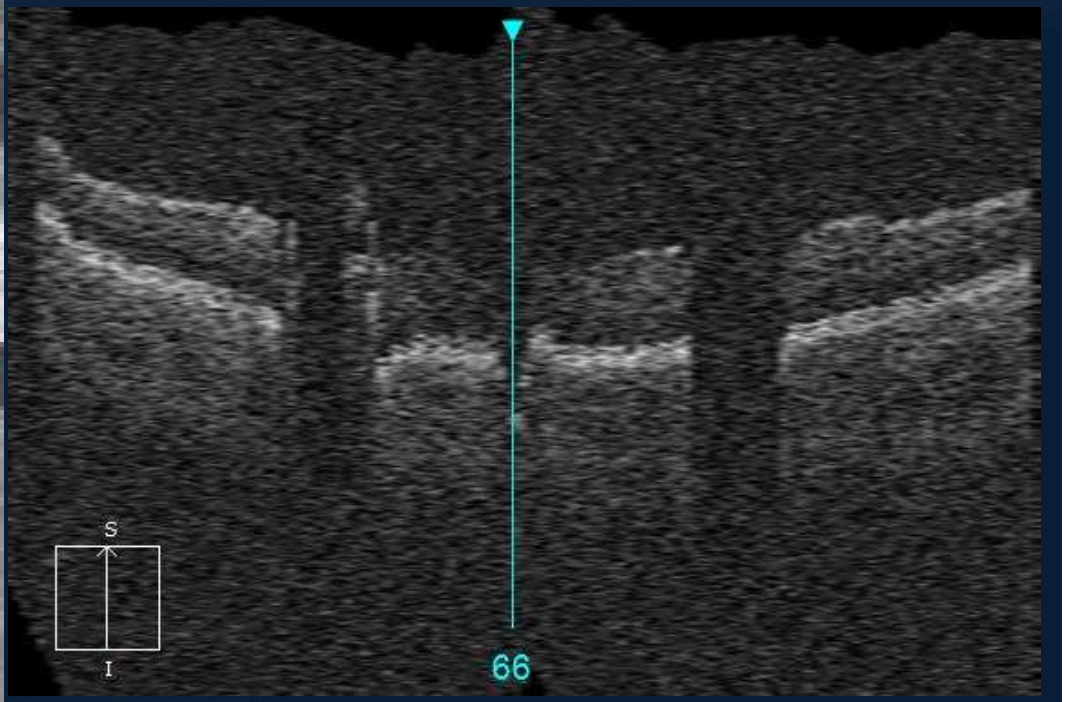
SCAN QUALITY - MOTION ARTEFACT



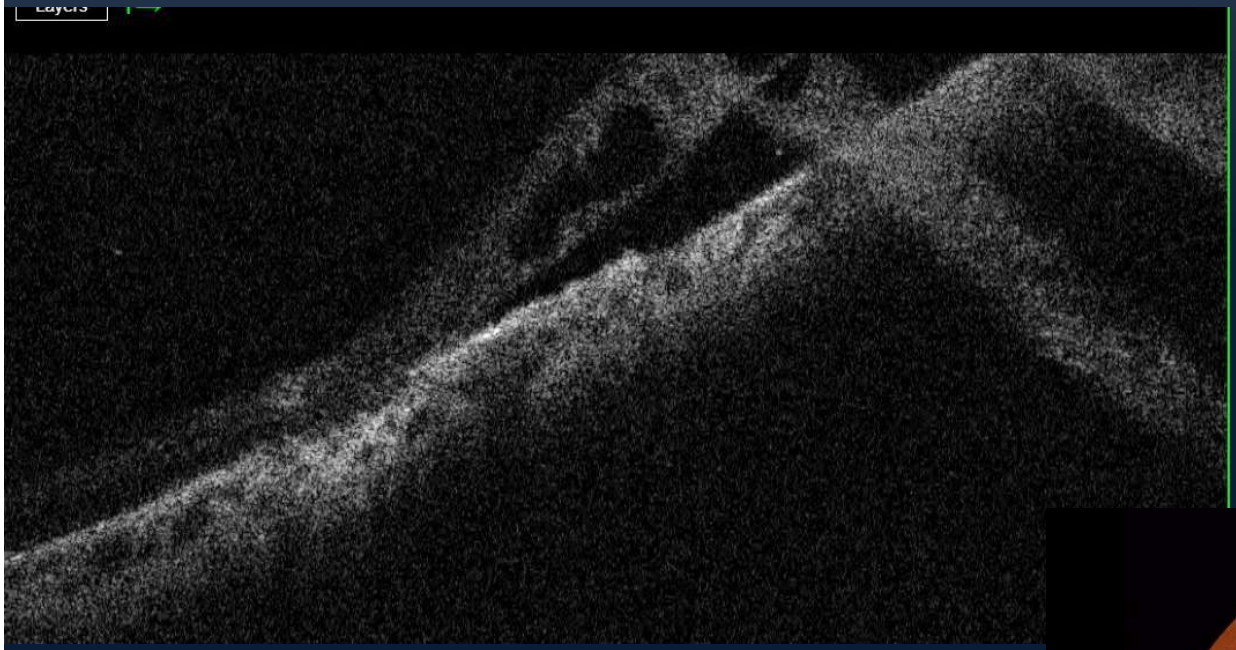


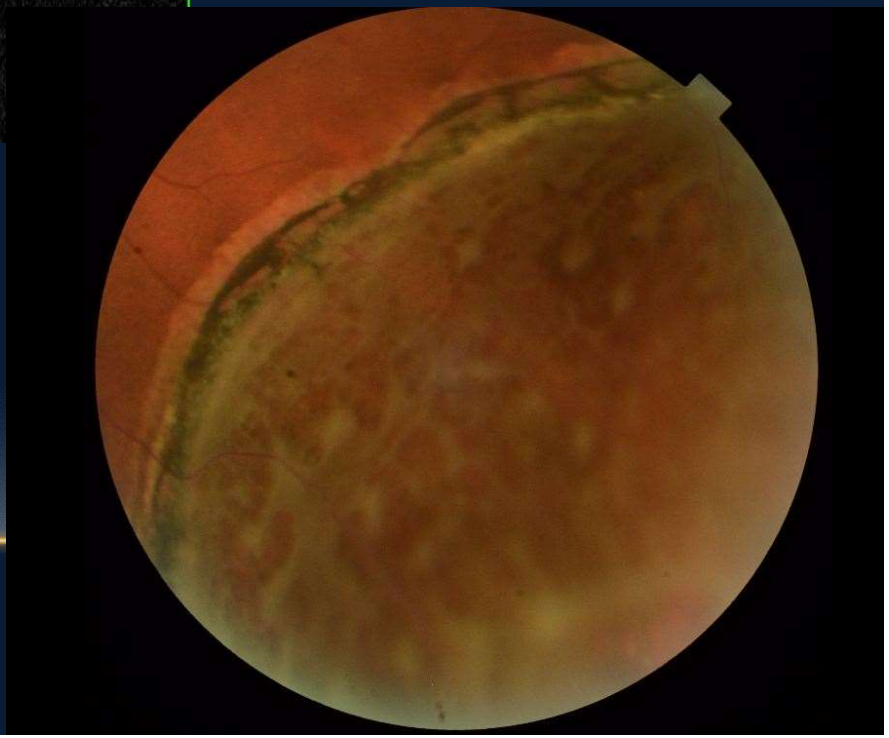
SCAN QUALITY - BLINK ARTEFACT





SCAN QUALITY - MIRROR ARTEFACT





ASSESSMENT OF MACULAR OCT

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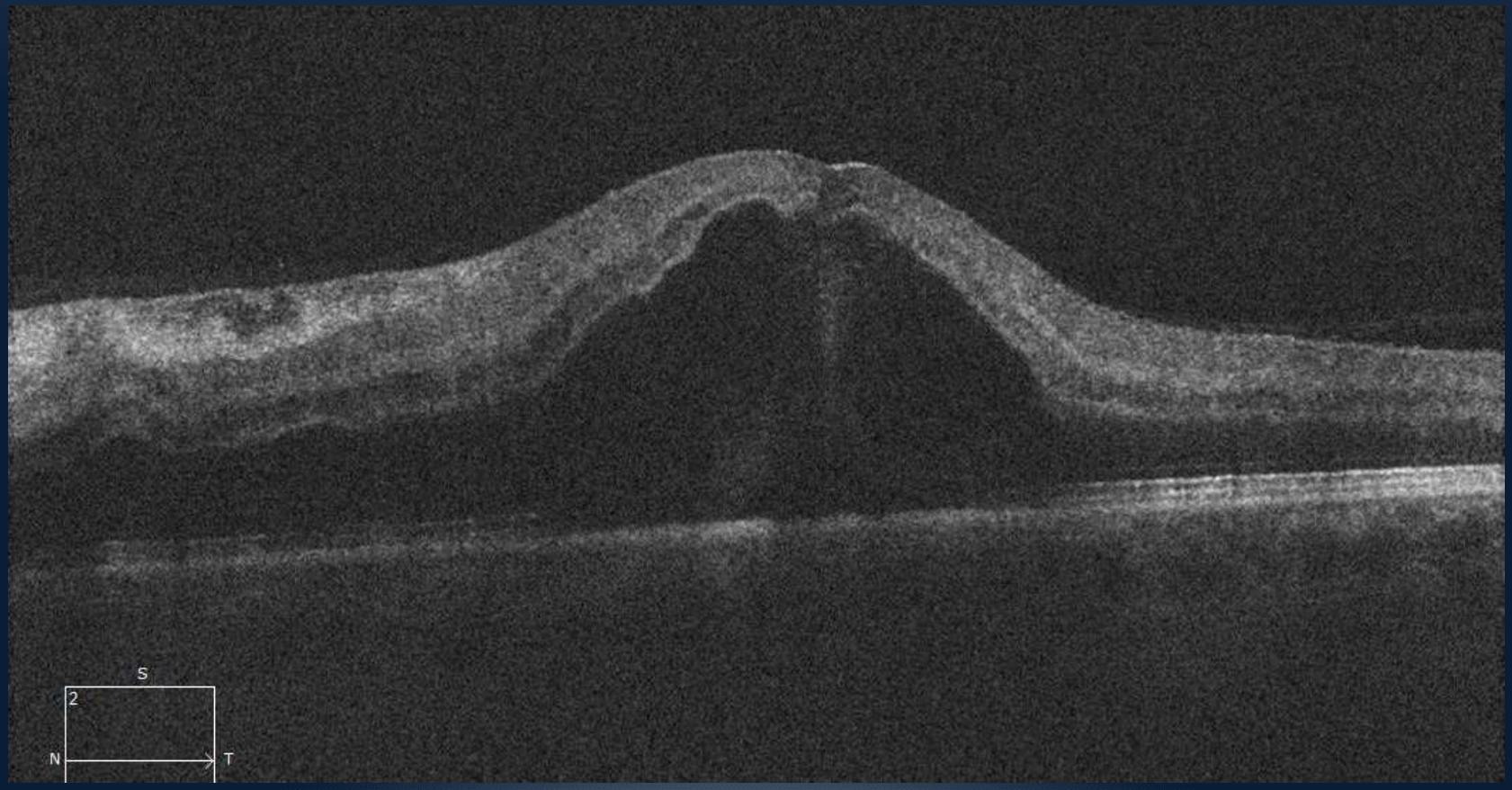
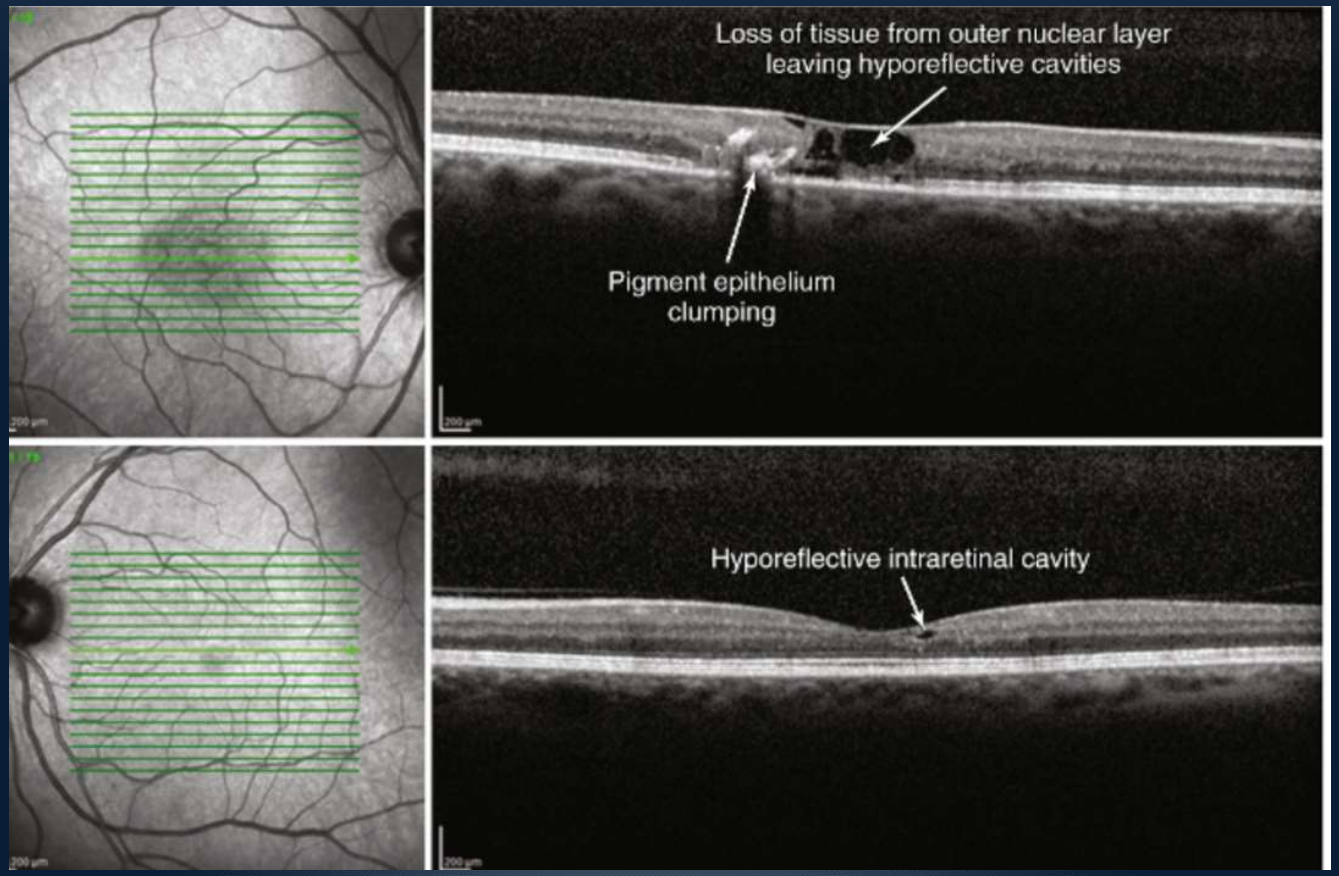
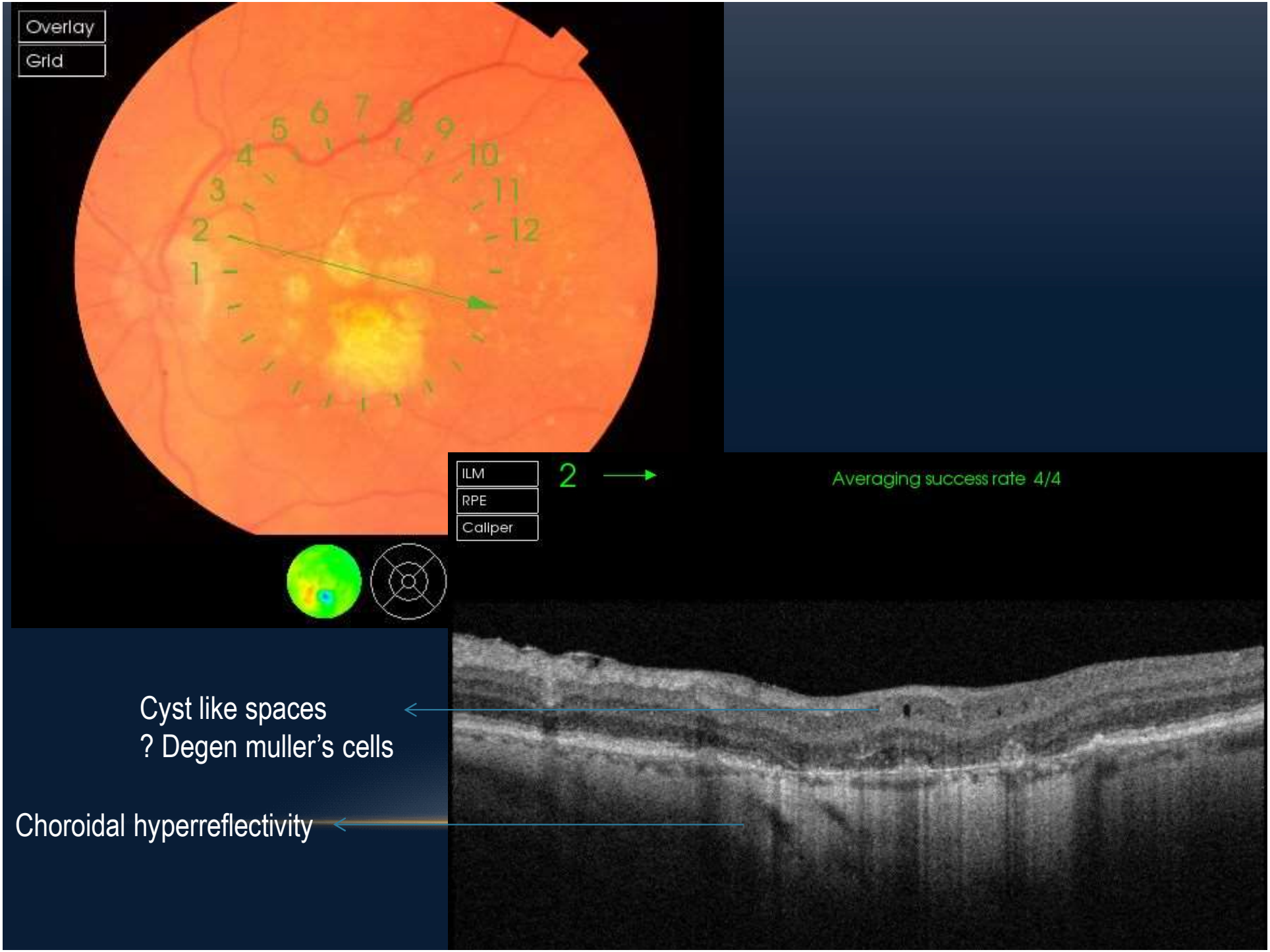
USE OF APPROPRIATE LANGUAGE – HYPOREFLECTIVE AREA IN CRVO



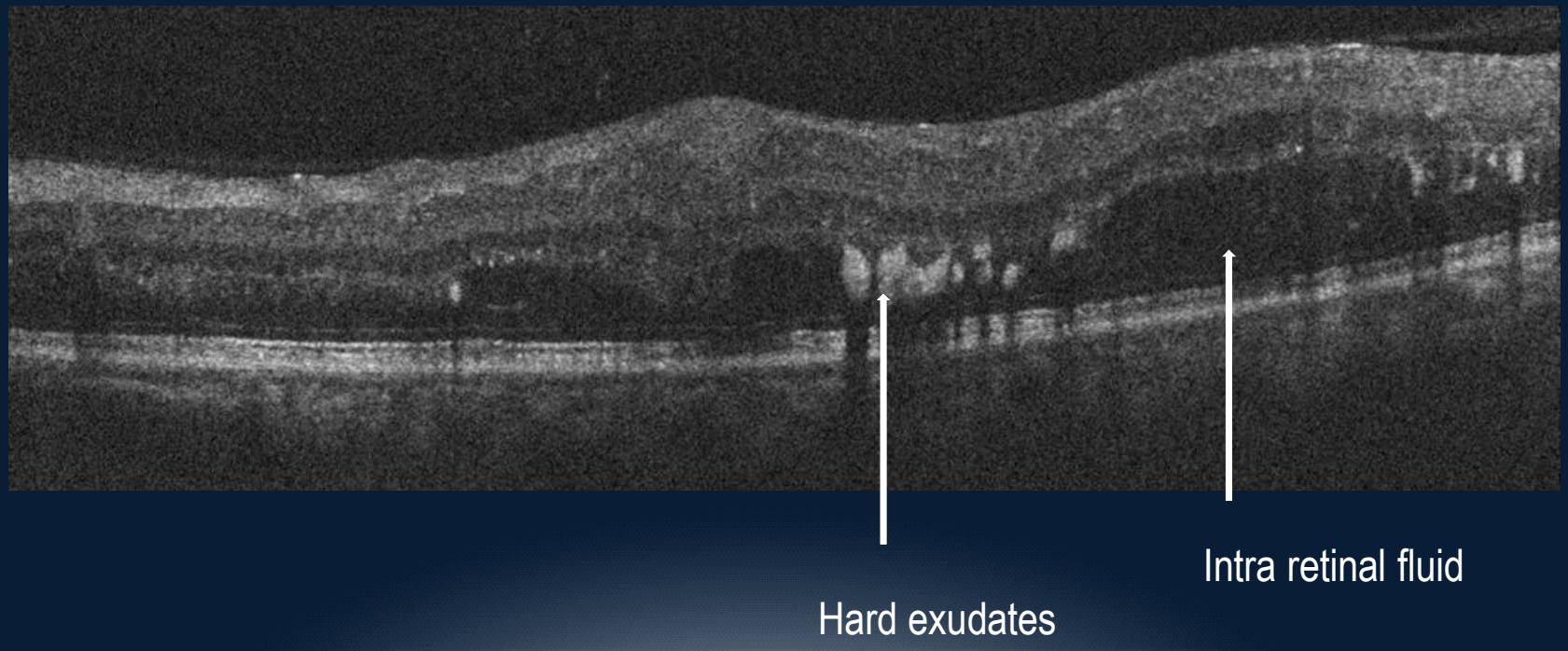
HYPOREFLECTIVE AREA IN MACTEL



ATLAS OF RETINAL OCT GOLDMAN R ET AL


Overlay
Grid
ILM
RPE
Caliper
2
Averaging success rate 4/4
Cyst like spaces
? Degen muller's cells
Choroidal hyperreflectivity

HYPER REFLECTIVE AREAS - DIABETIC RETINOPATHY



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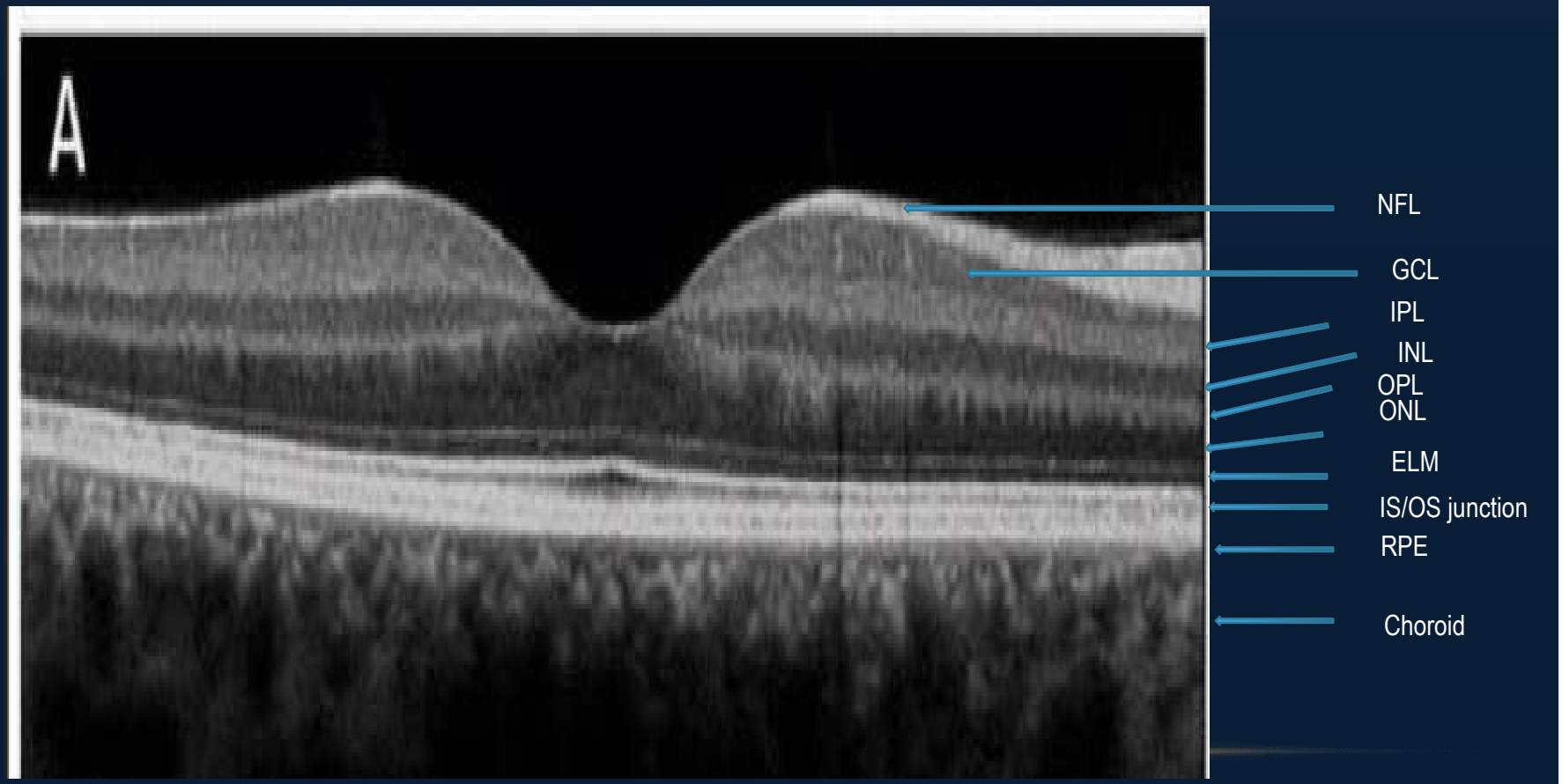
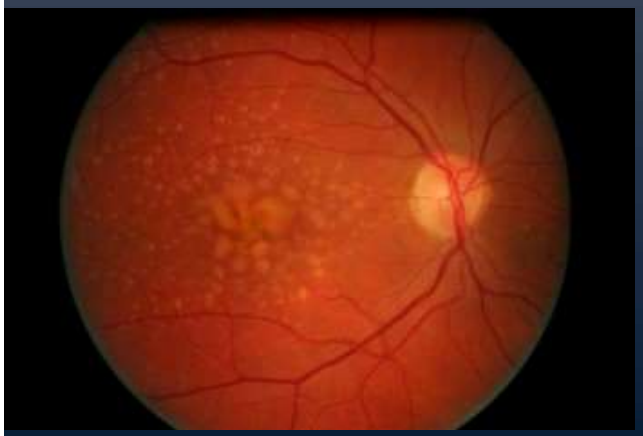
NORMAL OCT - MACULA

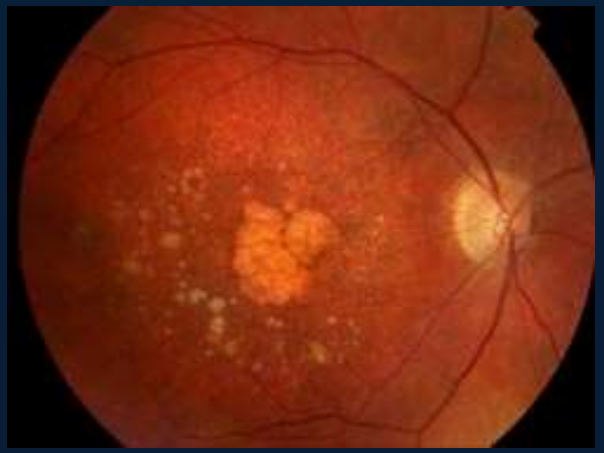


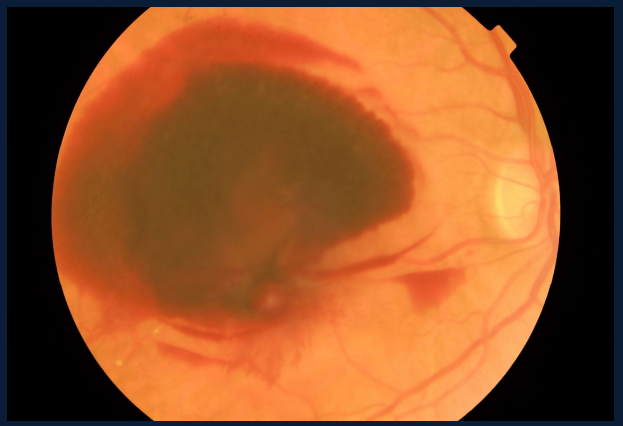
Discuss OCT features

1. RPE Changes
2. Outer Retinal Changes
3. Inner Retinal Changes
4. IS/OS Junction
5. Vitreous Changes

RPE ABNORMALITY

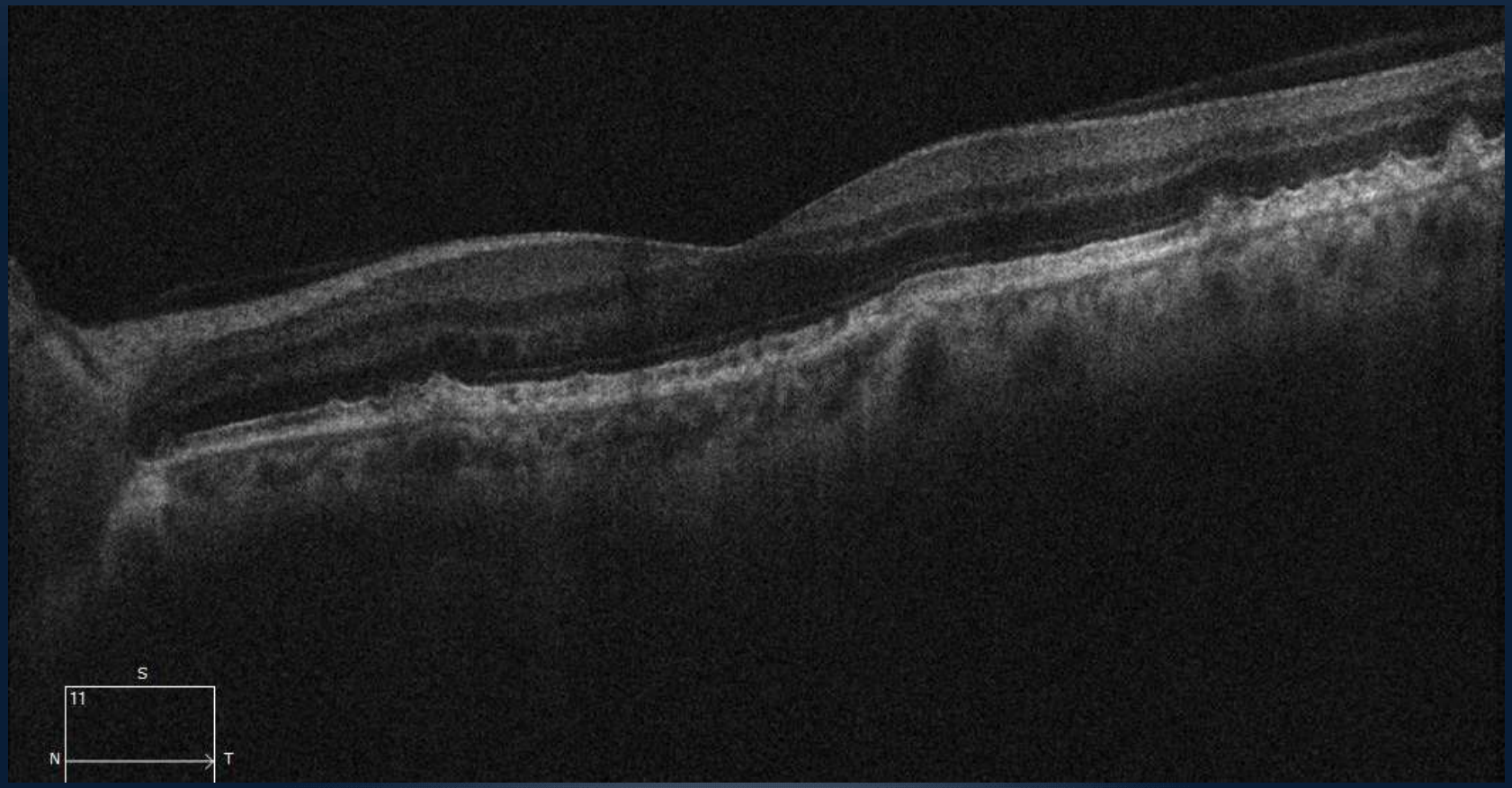




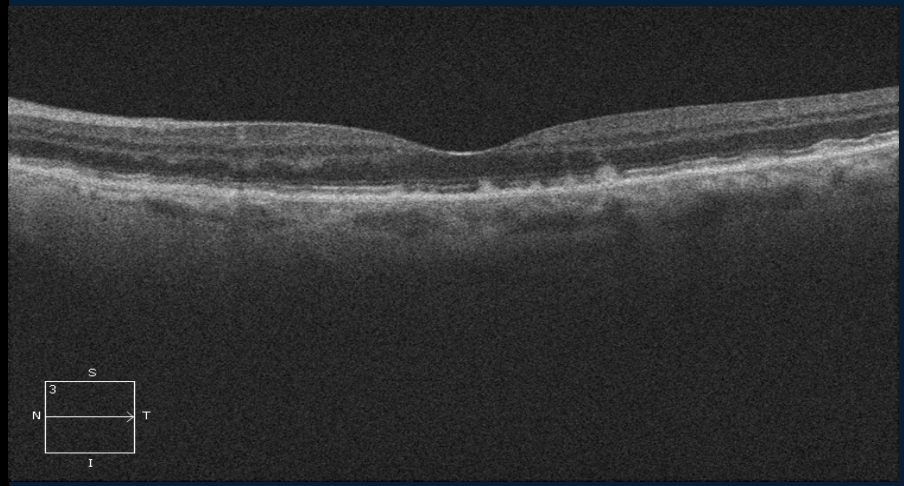


AMD

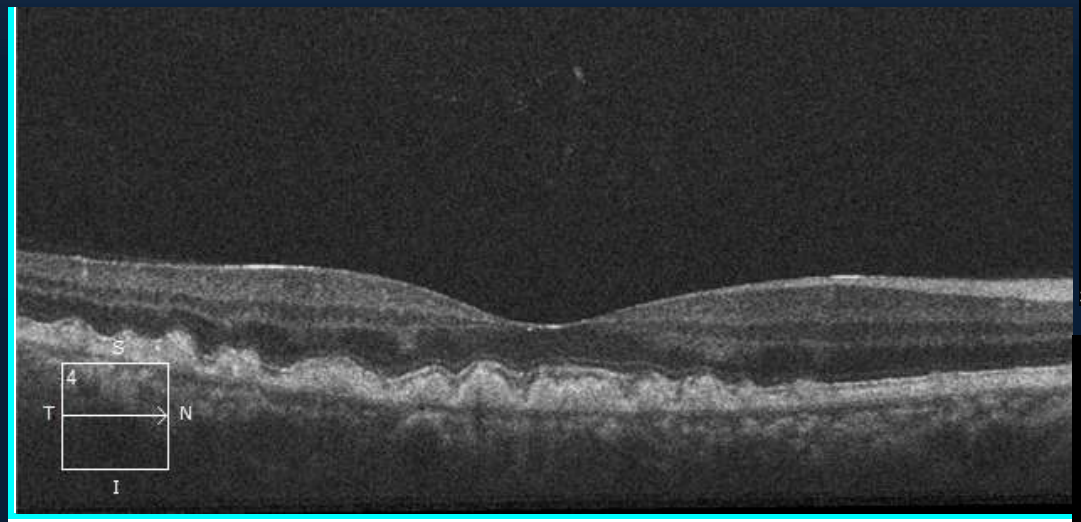
DRUSEN

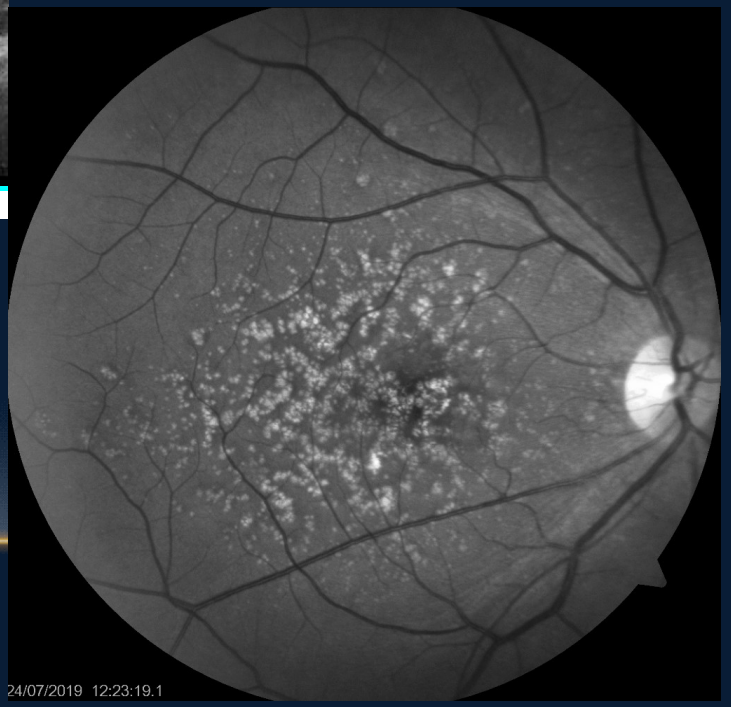


RETICULAR DRUSEN

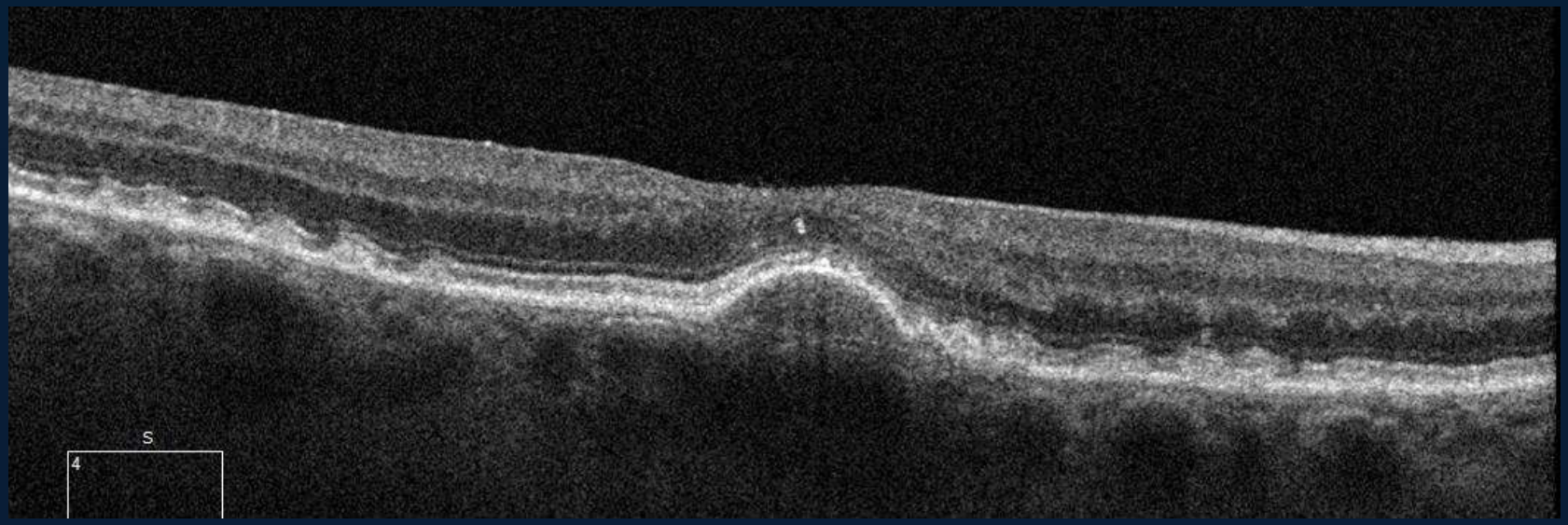


CUTICULAR DRUSEN

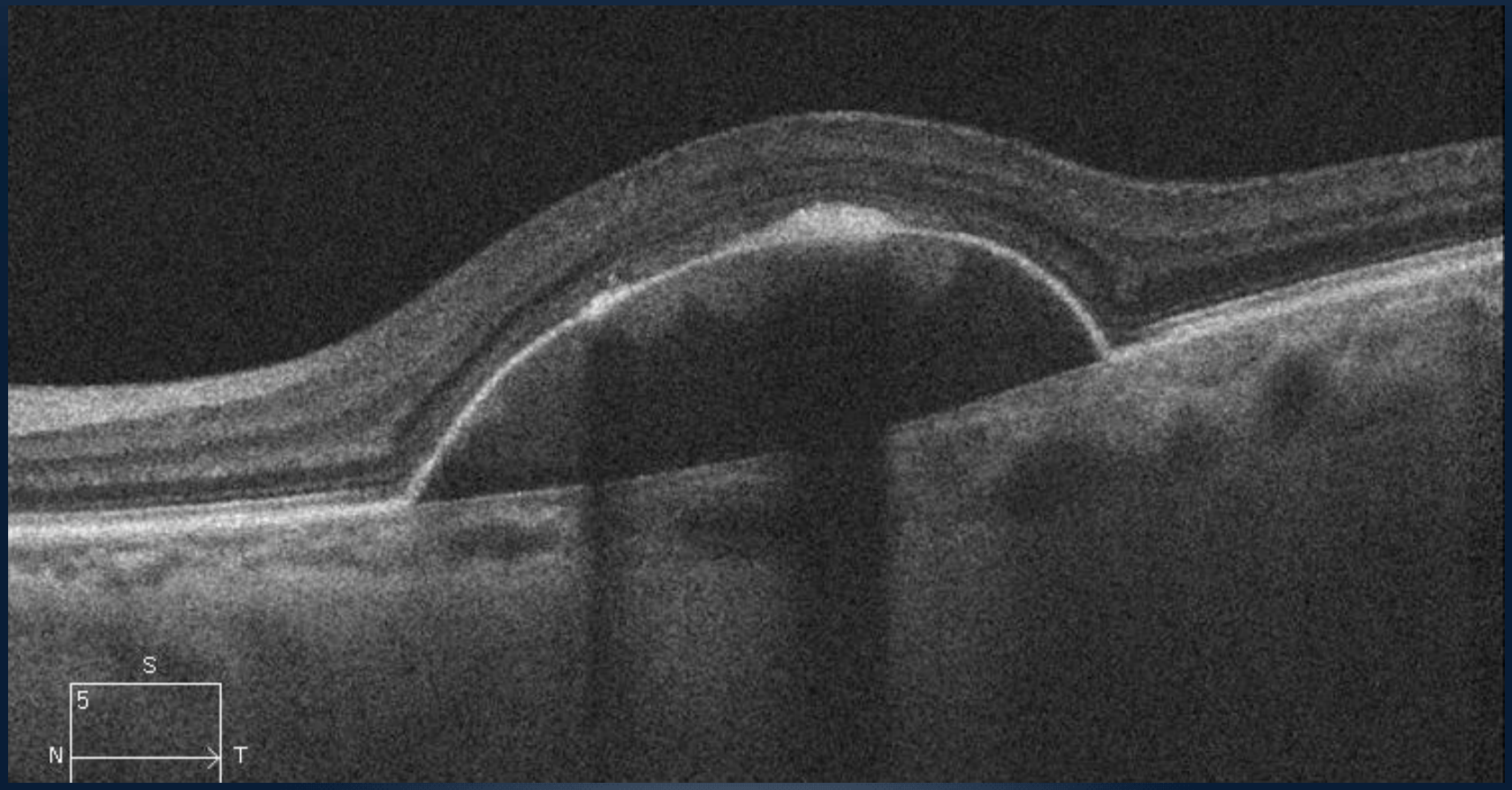




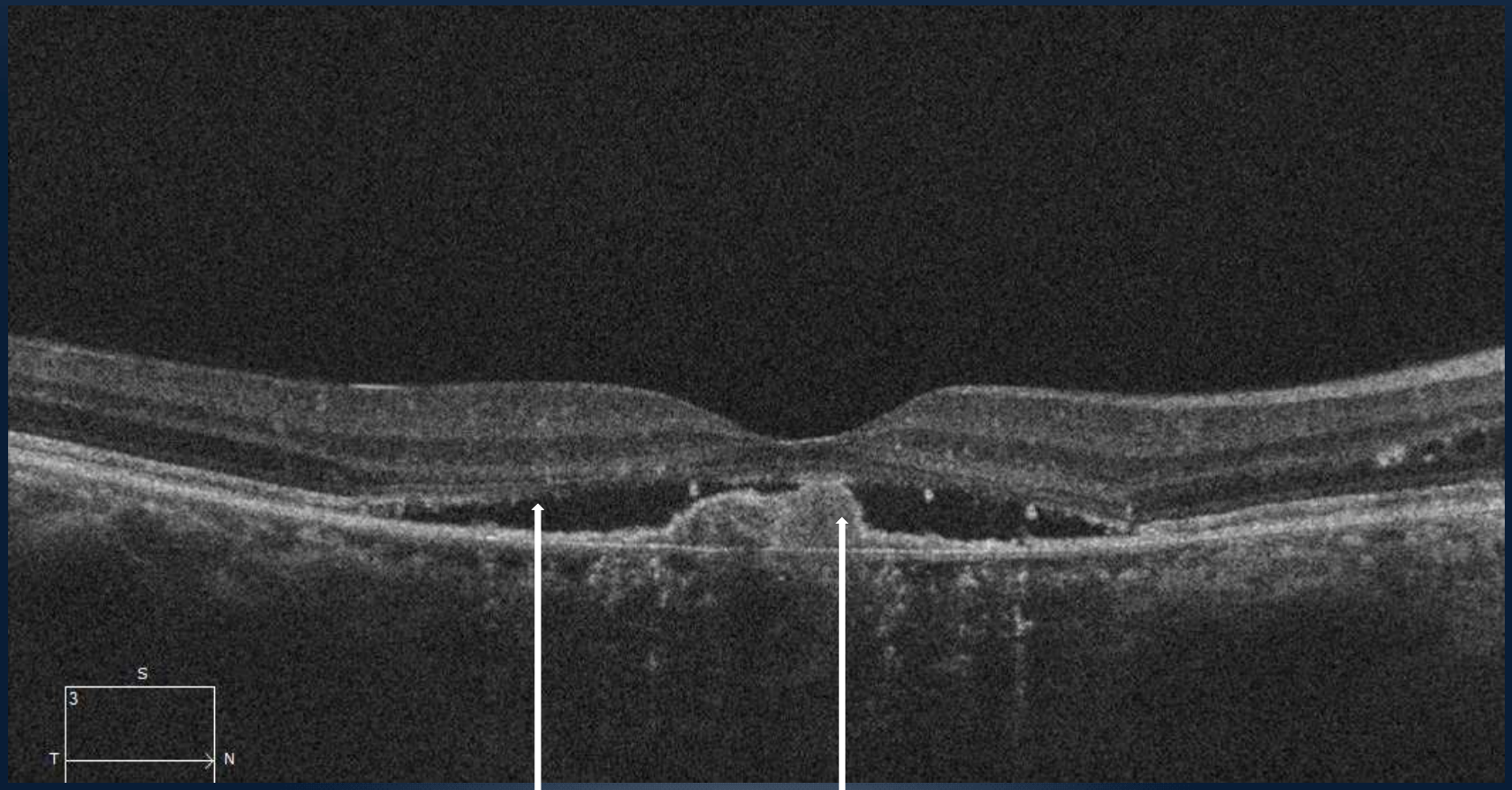
DRUSENOID PED



ISOLATED PIGMENT EPITHELIAL DETACHMENT



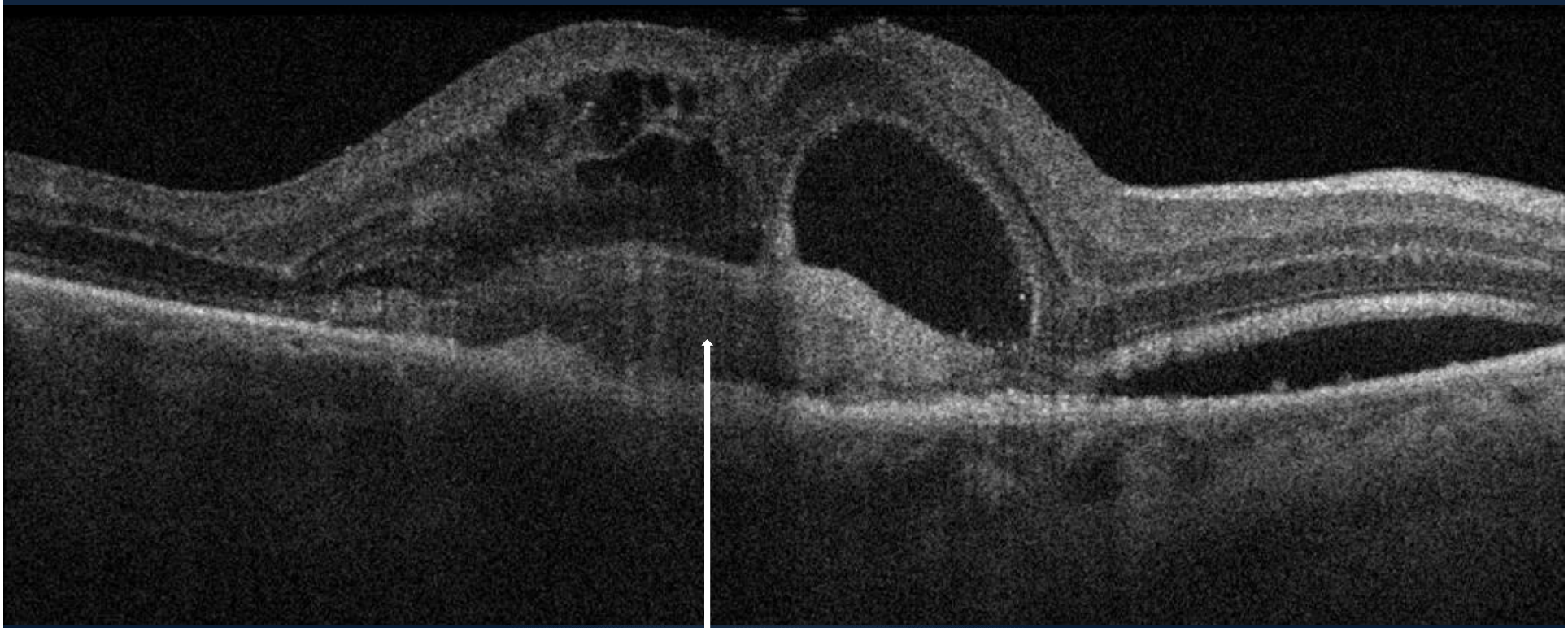
NEOVASCULAR AMD TYPE 1 CNVM



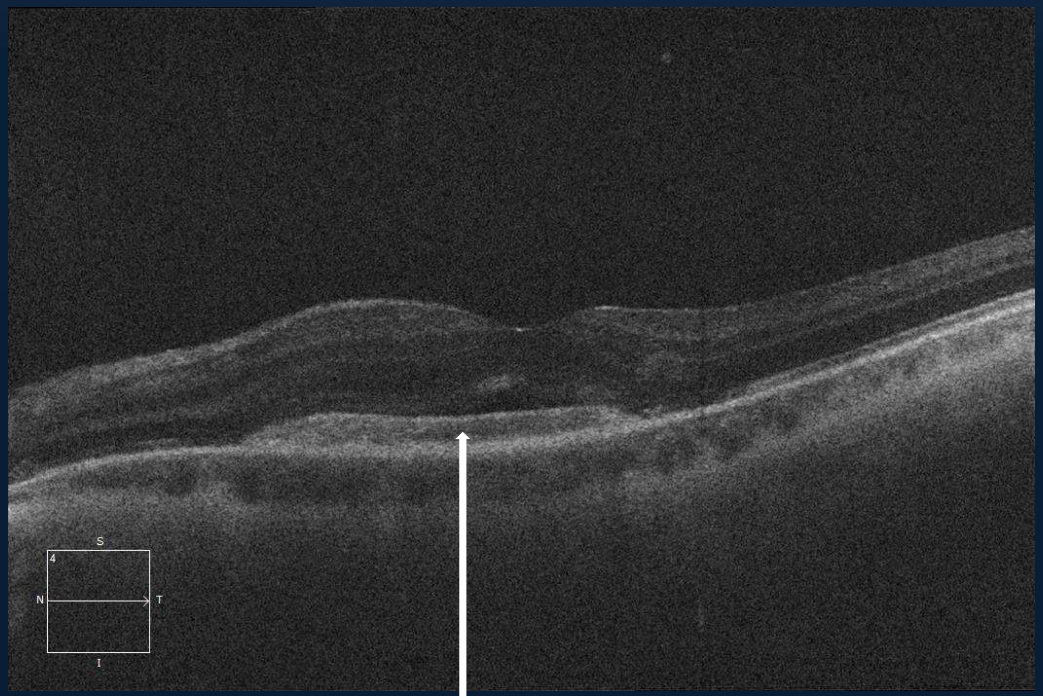
Subretinal Fluid

PED with heterogenous internal reflectivity

NEOVASCULAR AMD – TYPE 2 CNVM

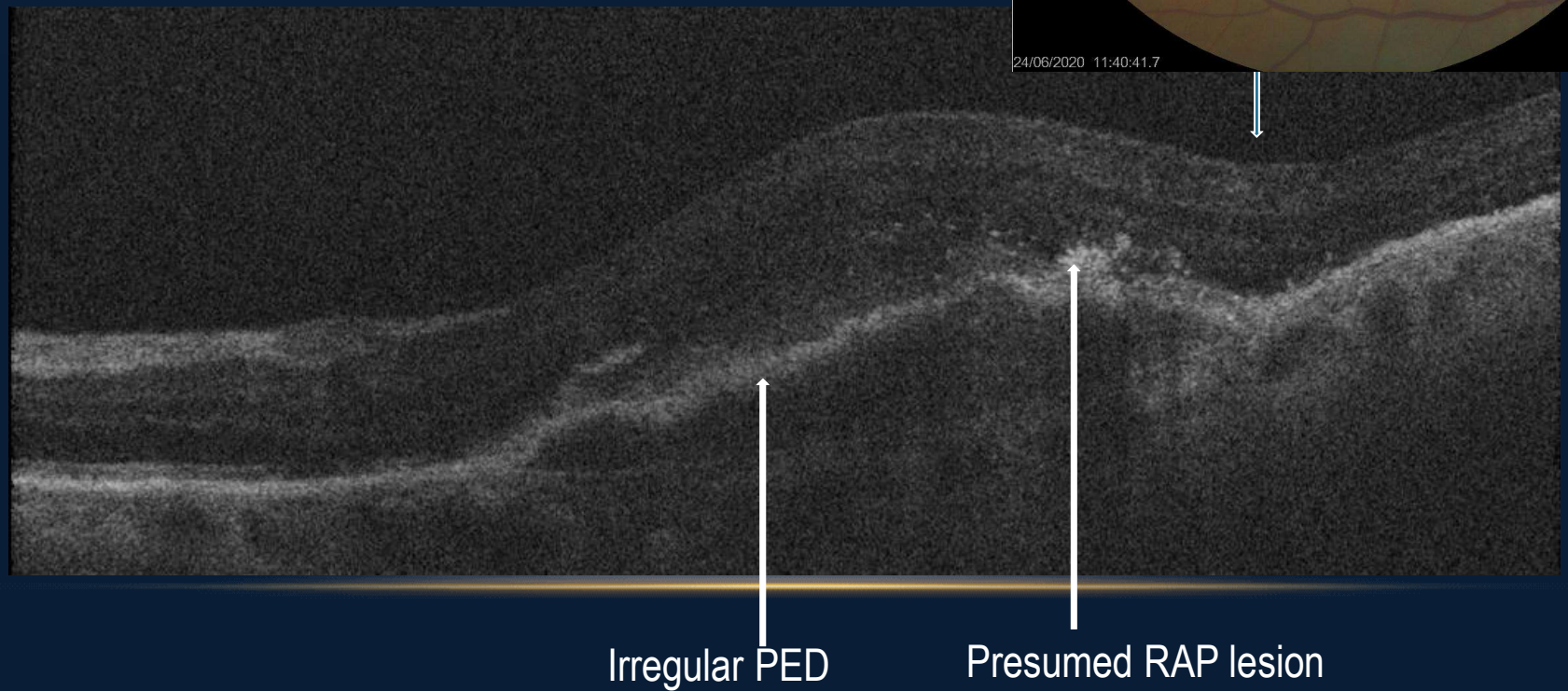


ACQUIRED TYPE 2 (MYOPIC) CNVM

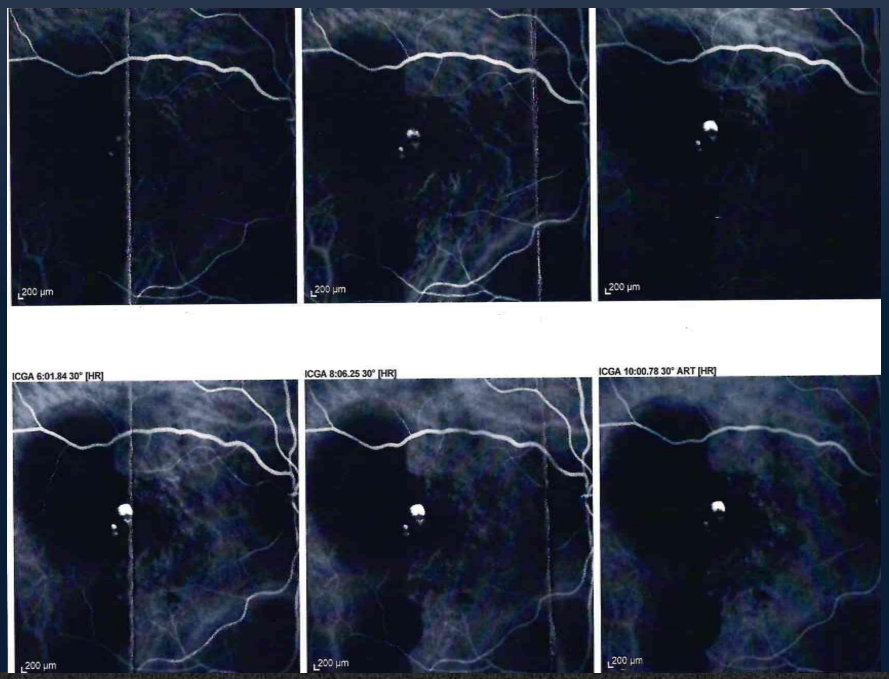


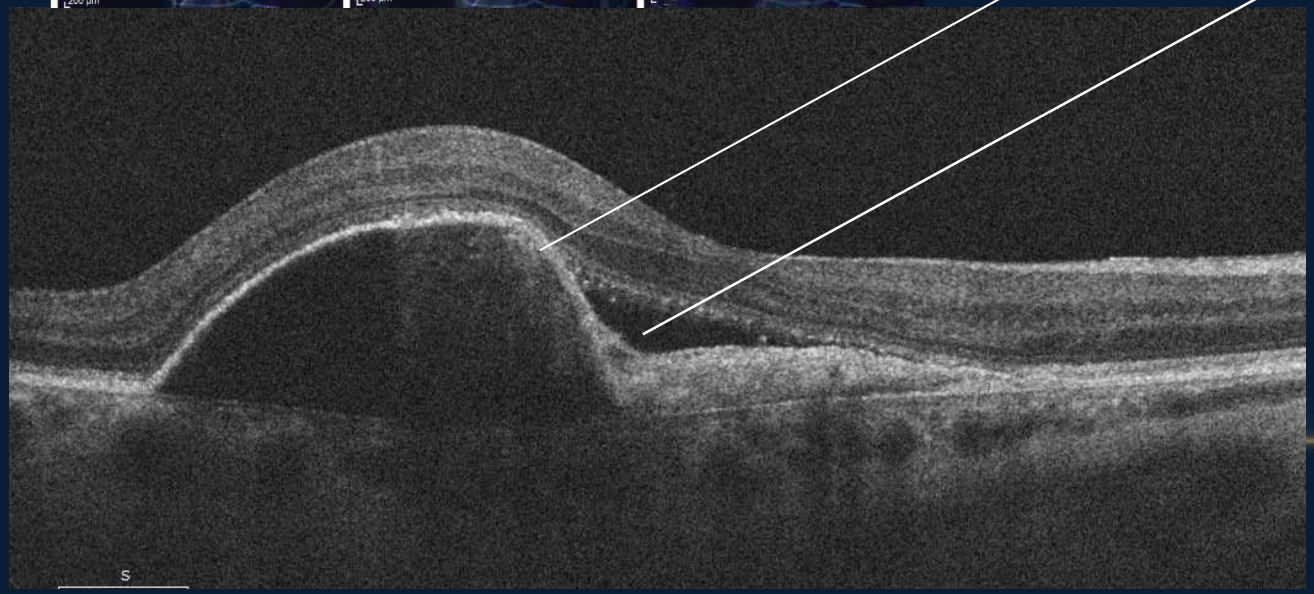
CNV Complex

TYPE 3 CNVM

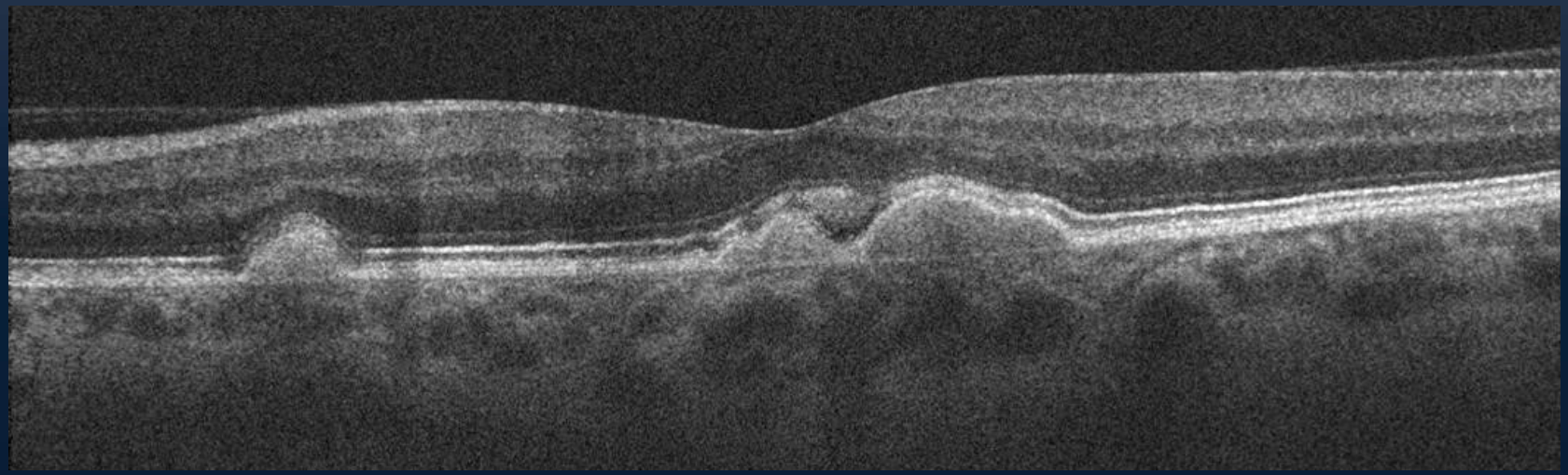


POLYPOIDAL CHOROIDAL VASCULOPATHY



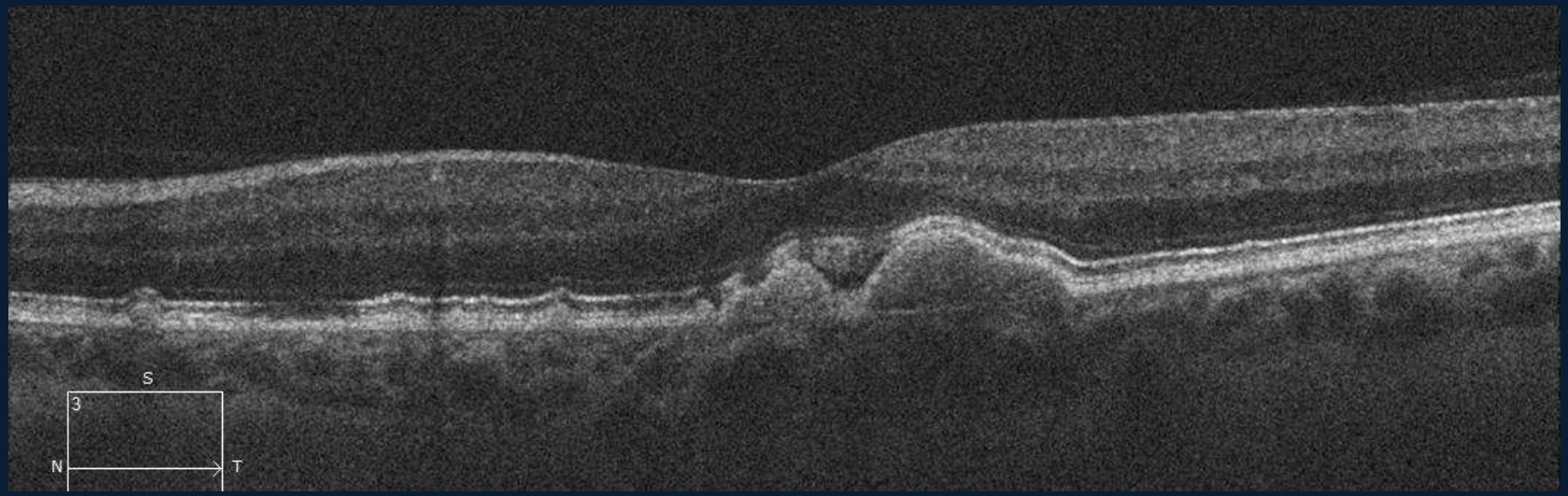


DRUSEN WITH SRF

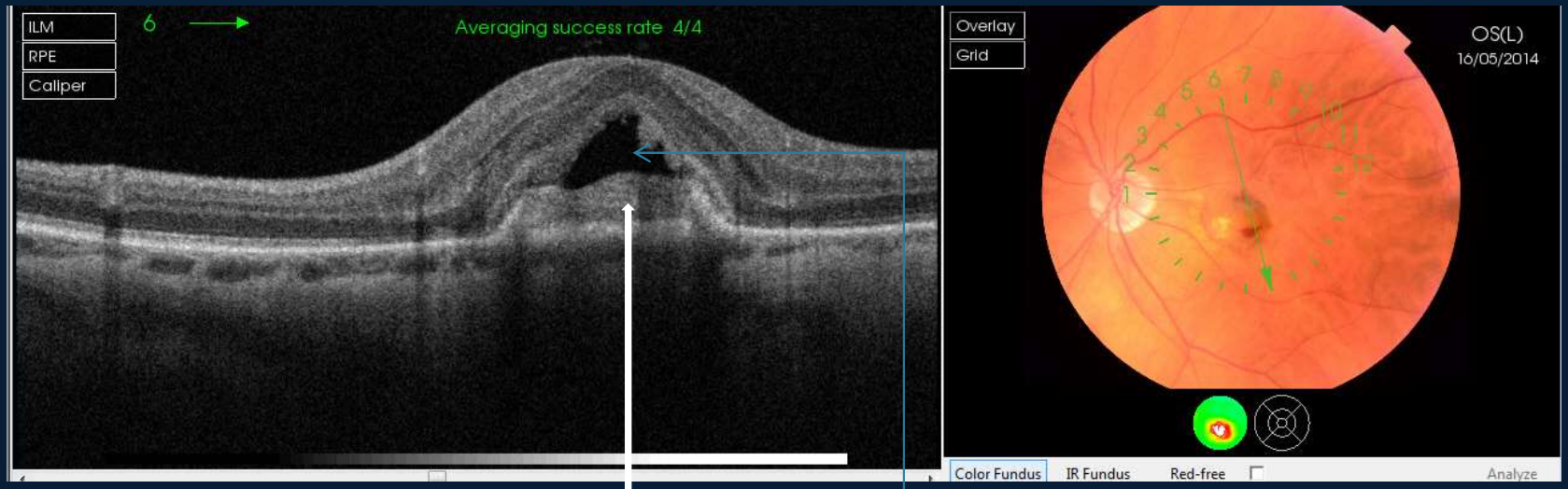


Polling Question 1

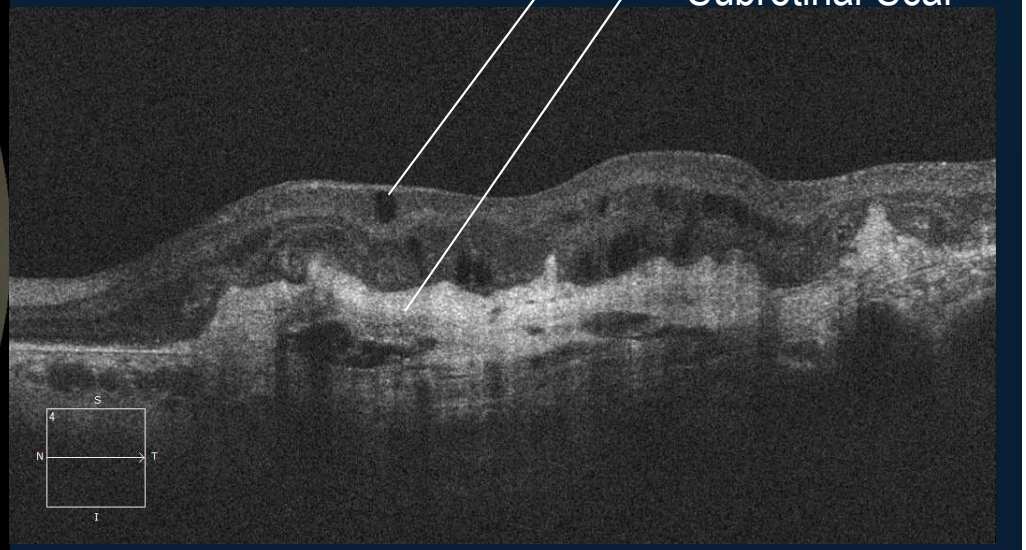
Same patient over 9 months



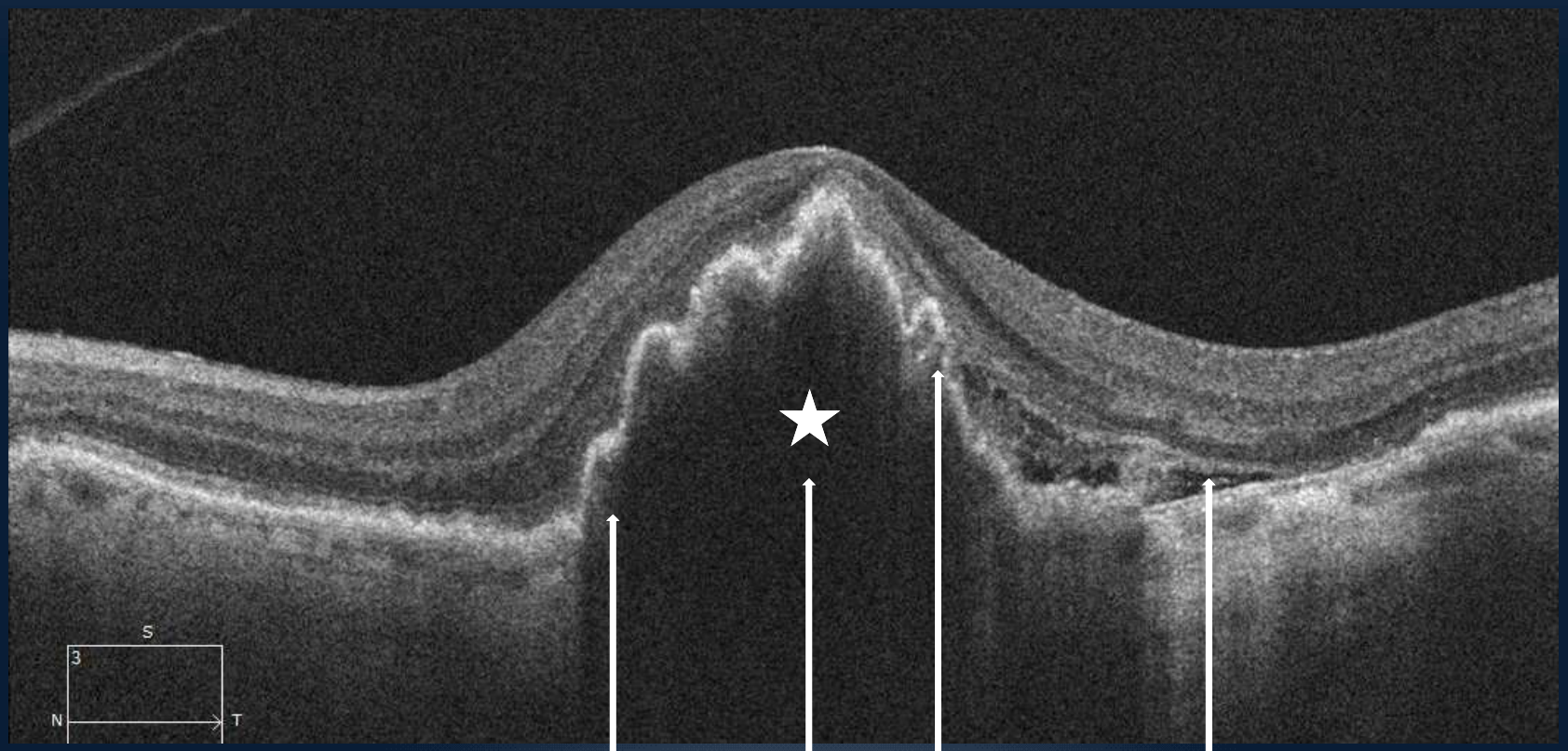
SUBRETINAL HAEMORRHAGE



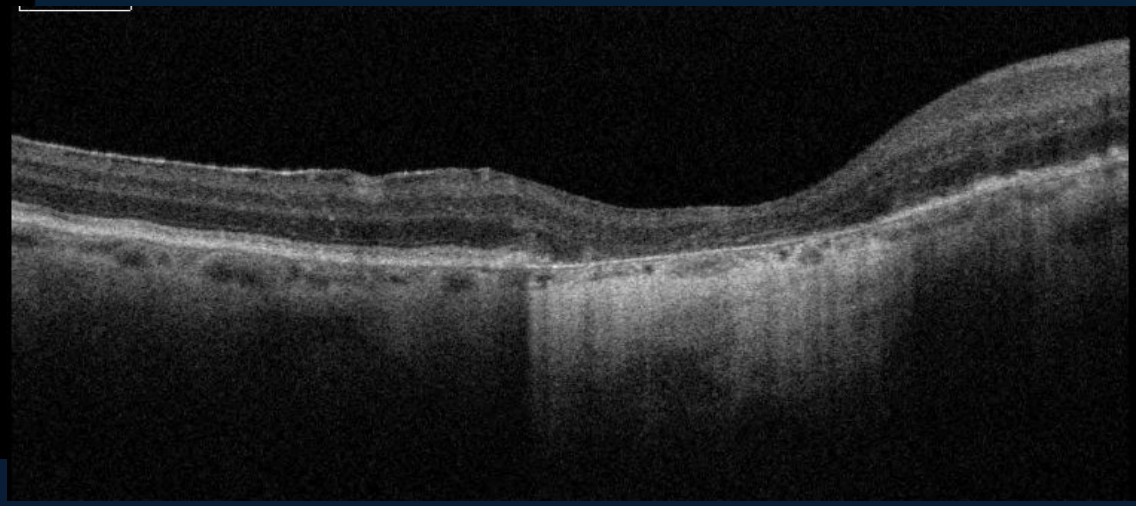
DISCIFORM SCAR



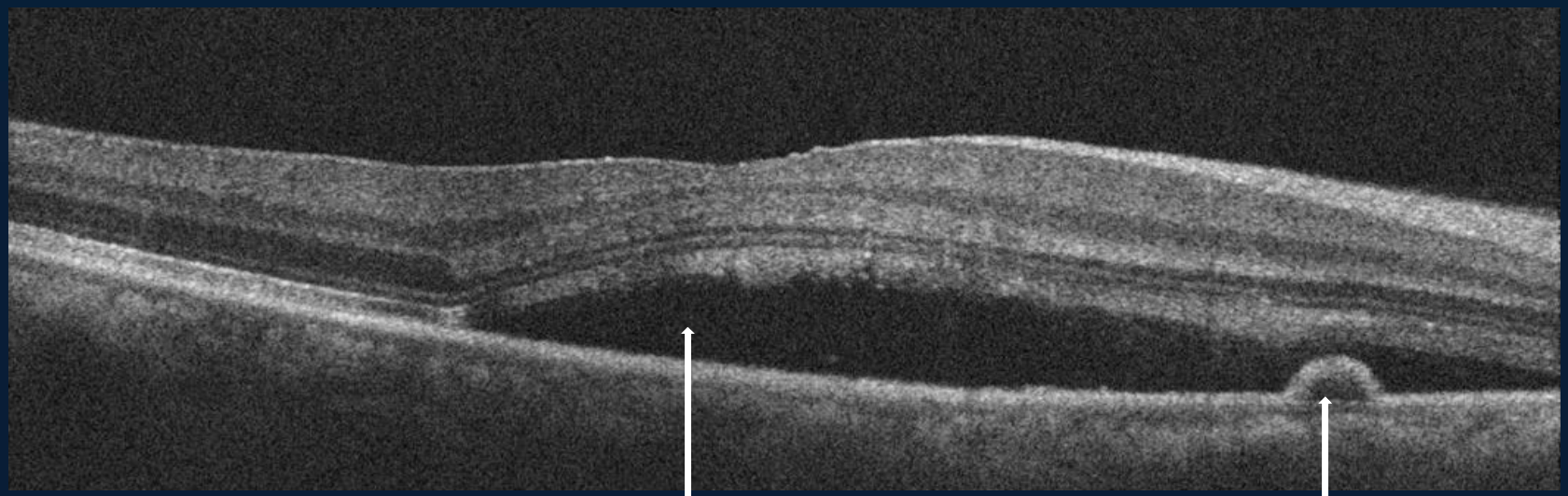
RETINAL PIGMENT EPITHELIAL TEAR



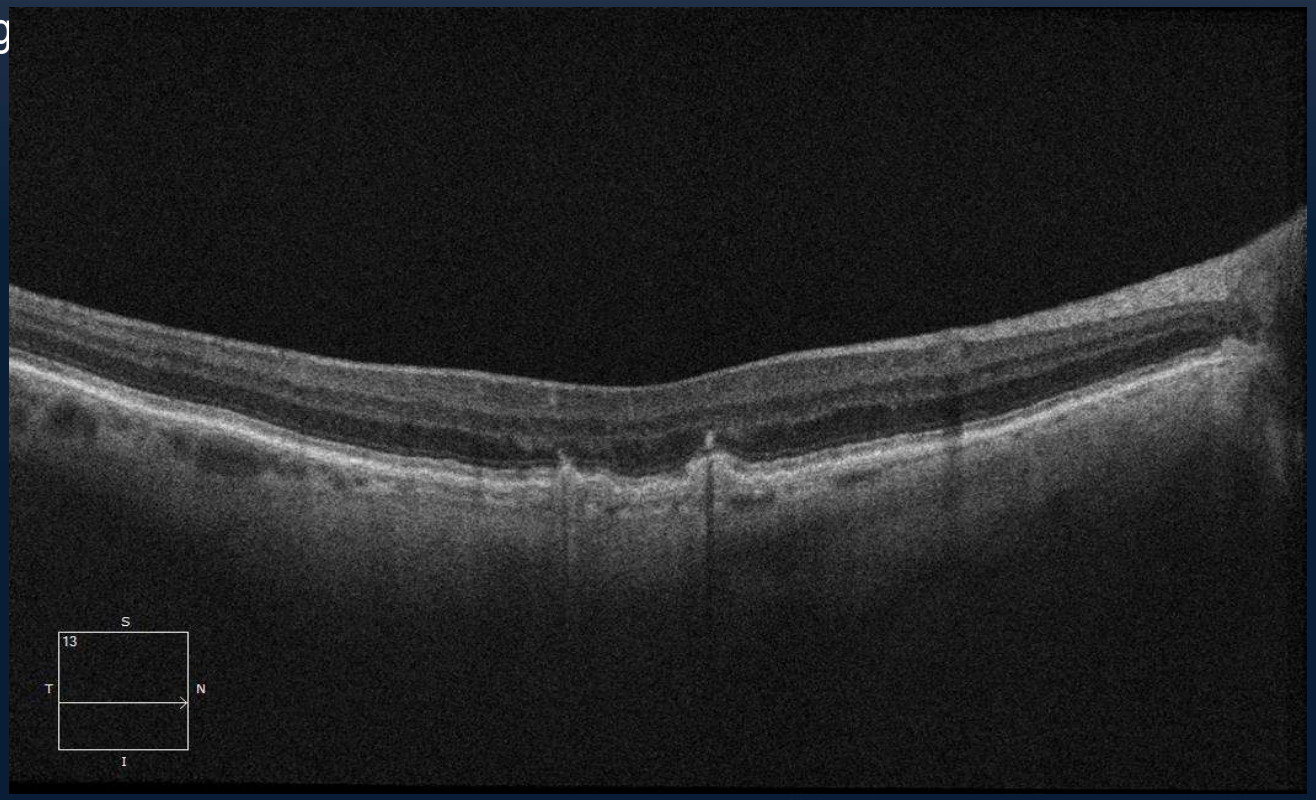
GEOGRAPHIC ATROPHY



CENTRAL SEROUS CHORIORETINOPATHY

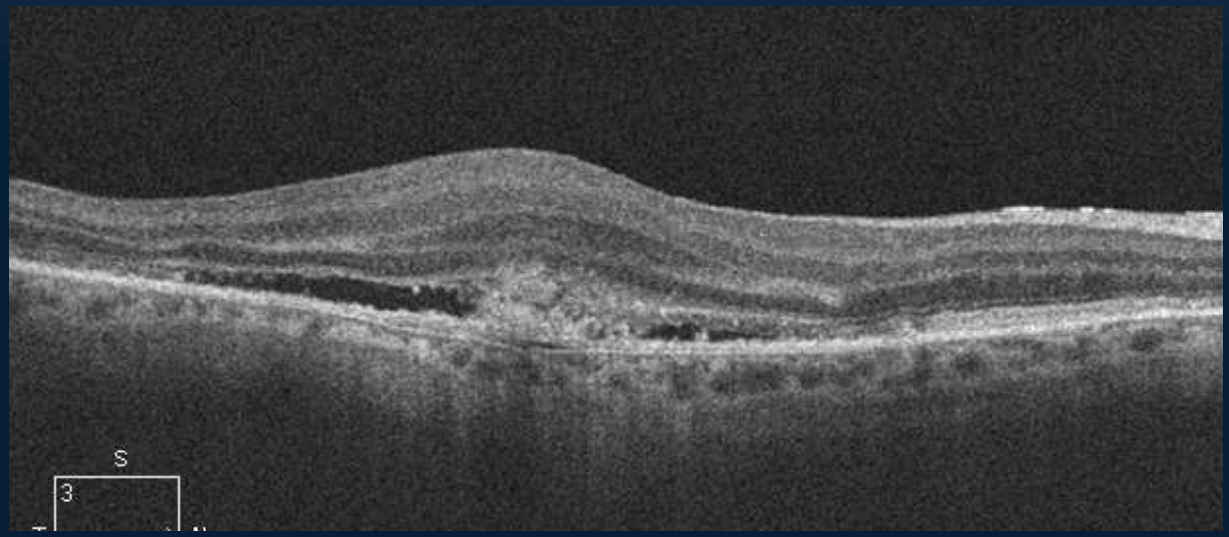


Polling Question 2. On routine examination of a 48 year old smoker, you notice that the patient has drusen at the macula. You perform an OCT. What would be your possible diag



A. Drusen
B. Type 2 CNVM
C. Geographic Atrophy

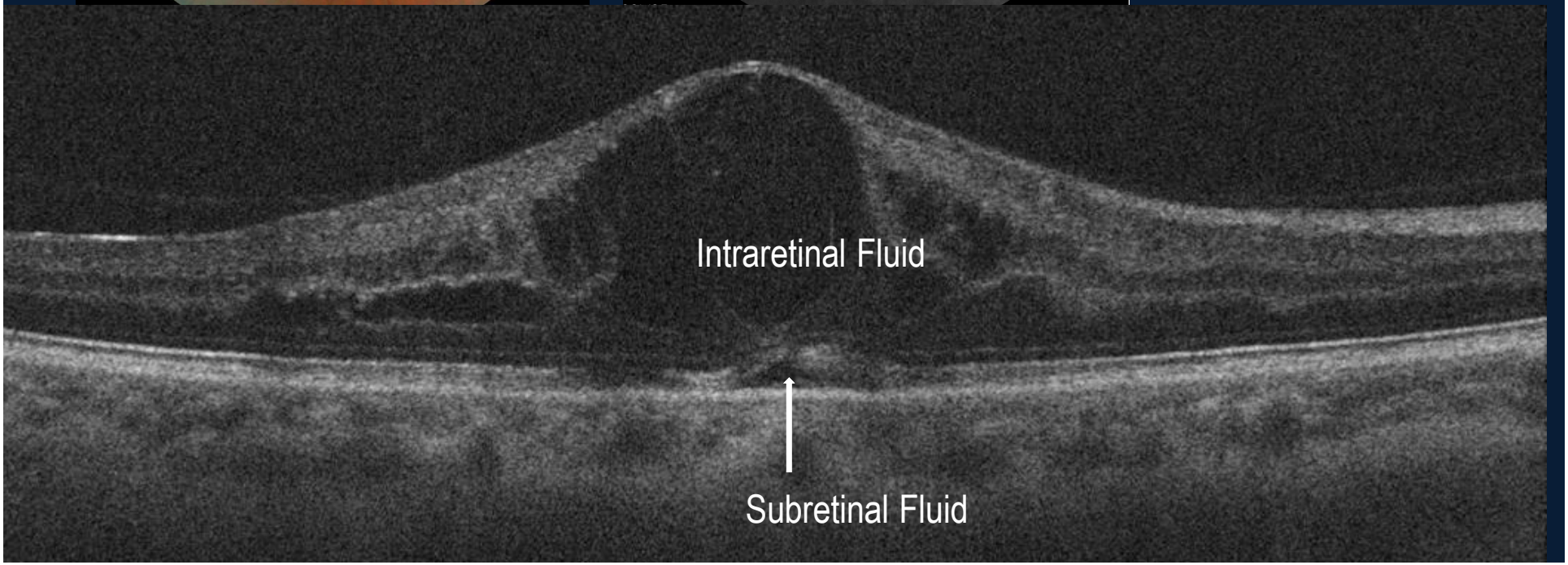
Polling Question 3. 75 year old patient presents with for routine update of spectacles. BCVA in the RE is 6/12. Based on the fundus examination, OCT is performed which is as below. What will you do?



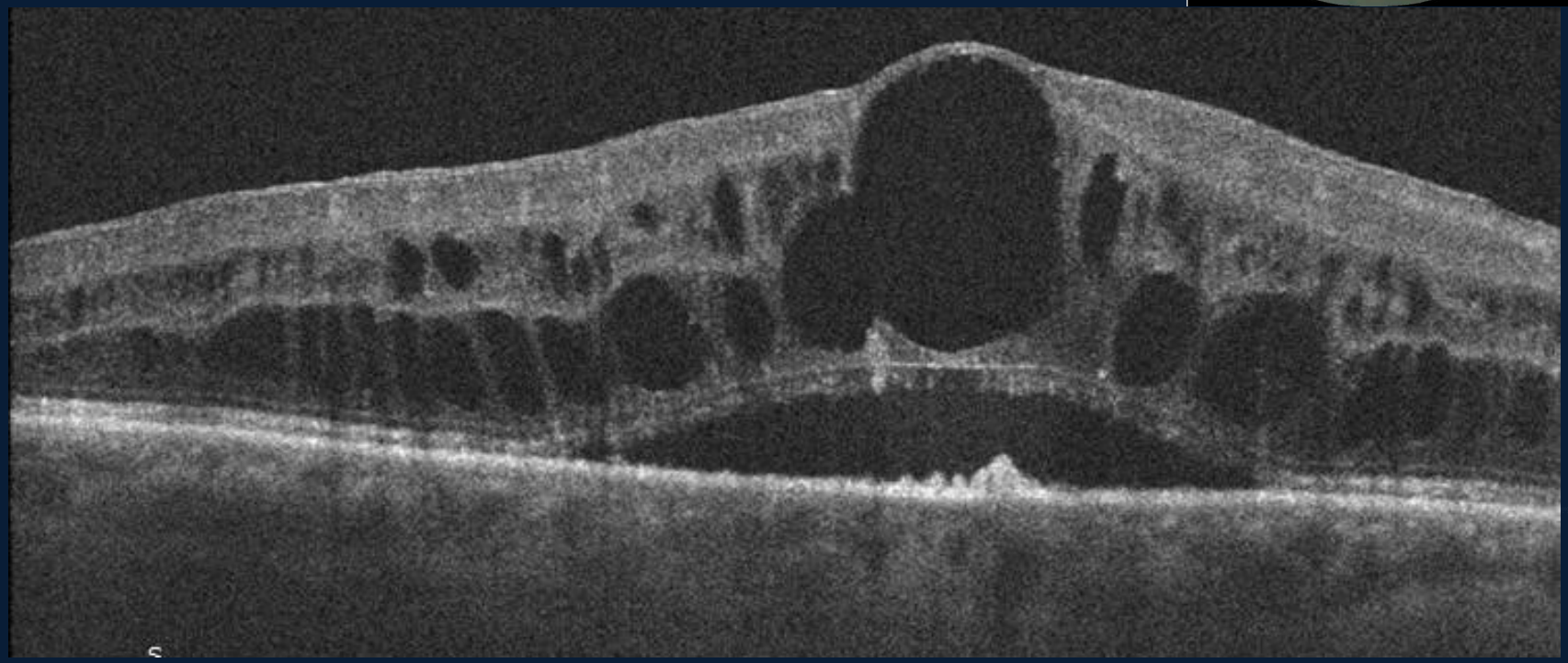
A. Prescribe glasses
B. Send a referral to the Ophthalmologist
C. Advise the patient to return for a follow up examination in 1 month for another trial of spectacles

OUTER RETINAL CHANGES

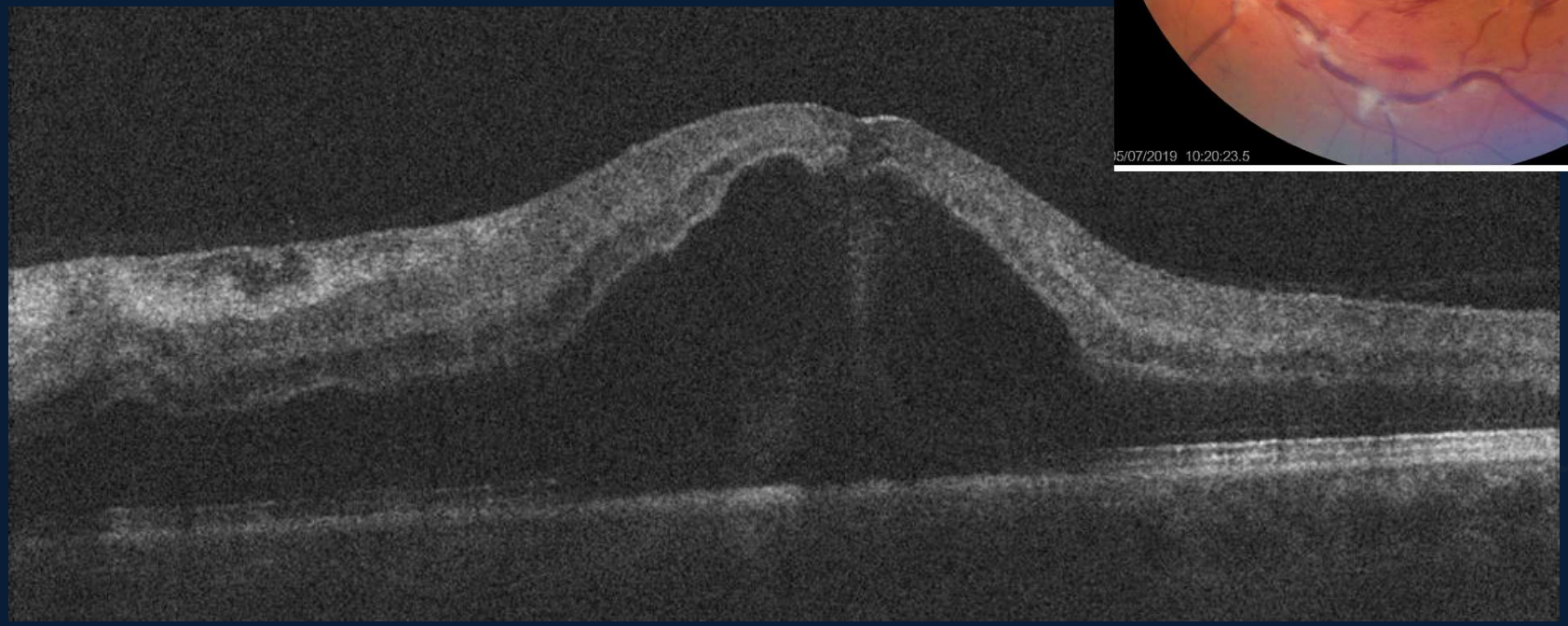
DIABETIC MACULAR EDEMA



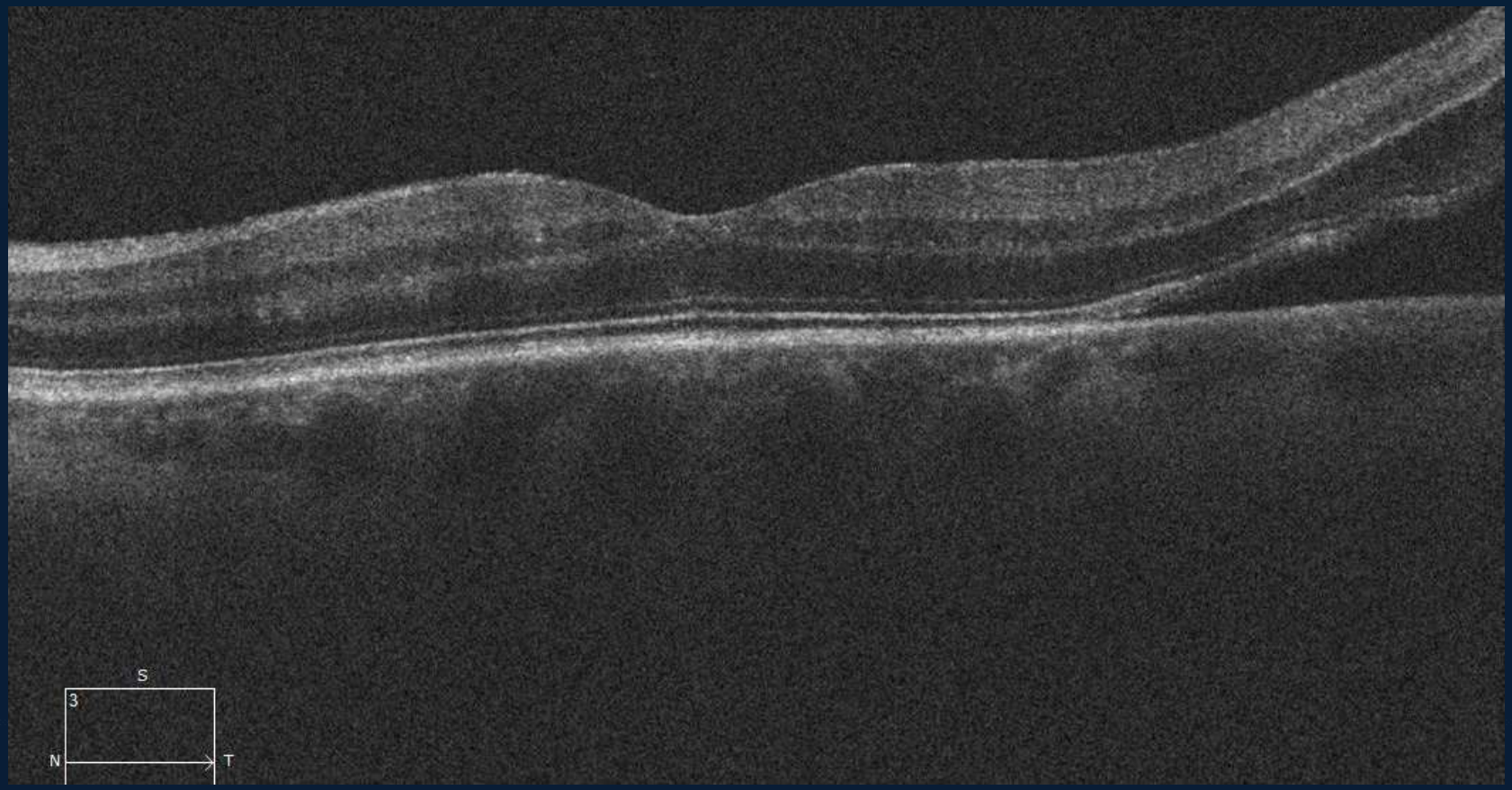
BRANCH RETINAL VEIN OCCLUSION



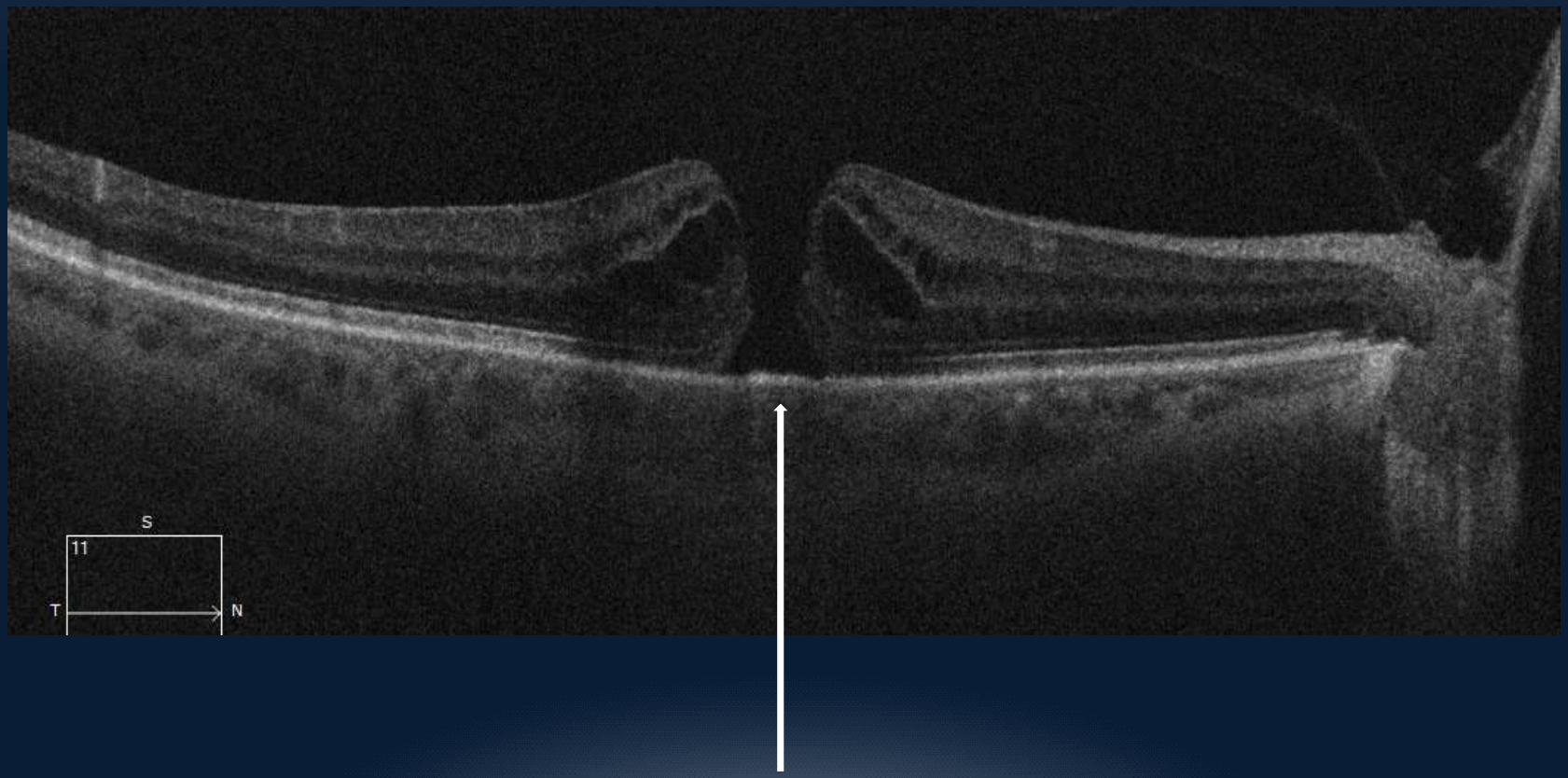
CENTRAL RETINAL VEIN OCCLUSION



RETINAL DETACHMENT

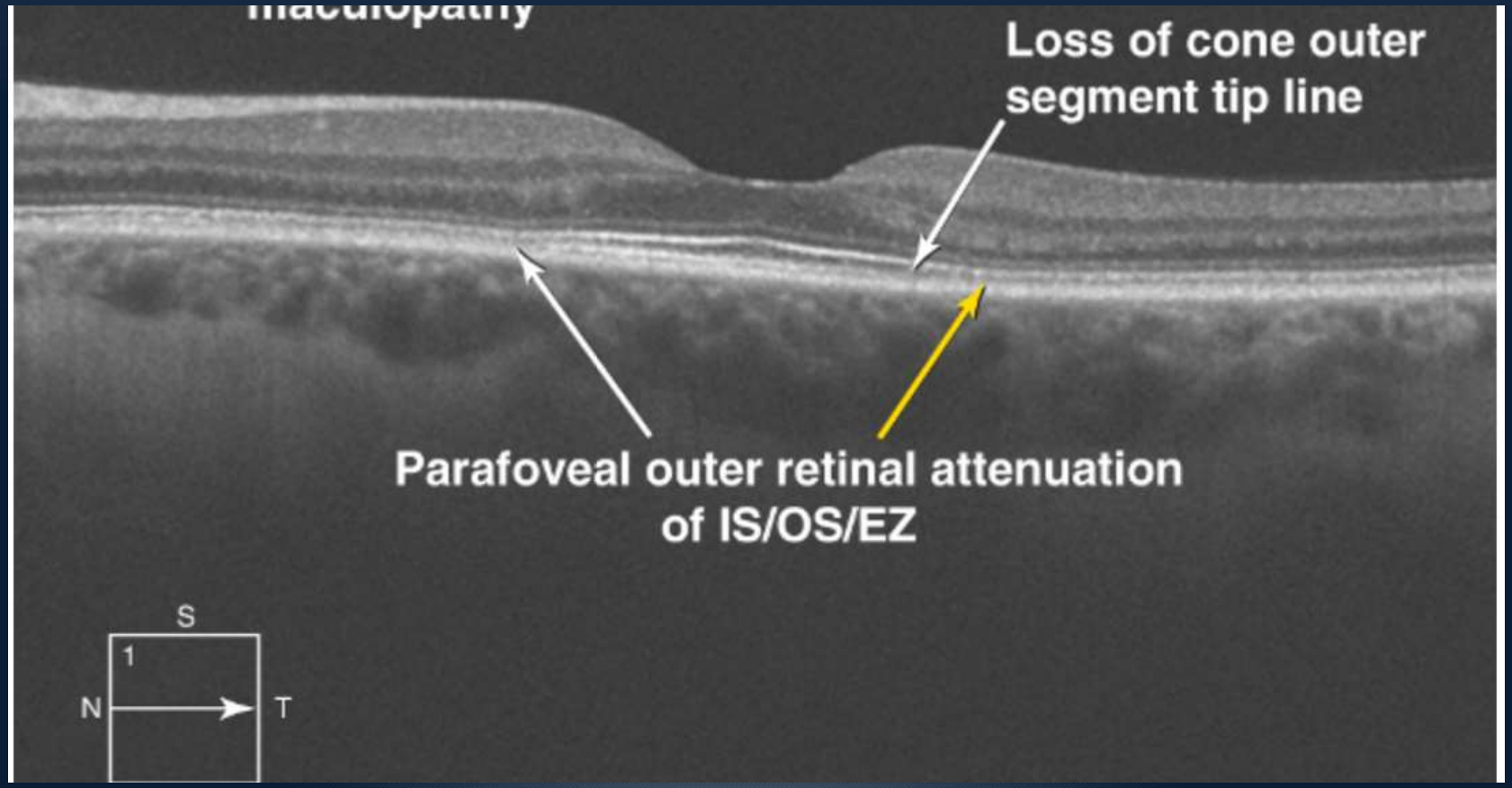


ELLIPSOIDAL LAYER/ IS-OS JUNCTION

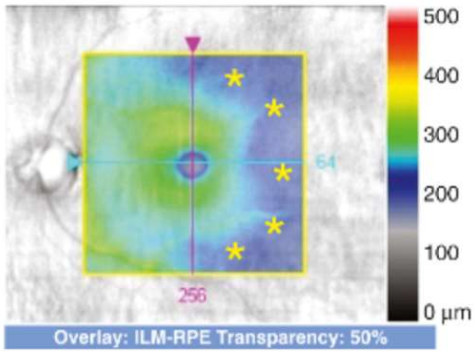


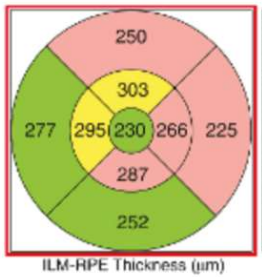
Full thickness Macular Hole

PLAQUENIL TOXICITY

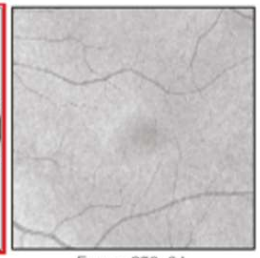


ATLAS OF RETINAL OCT GOLDMAN R ET AL



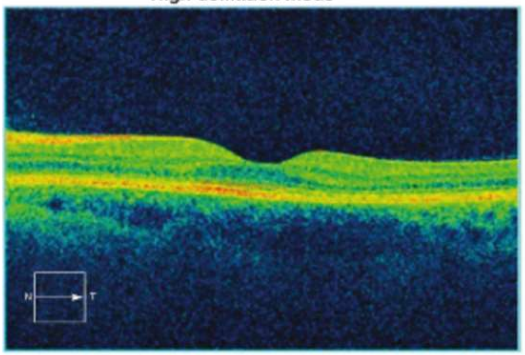


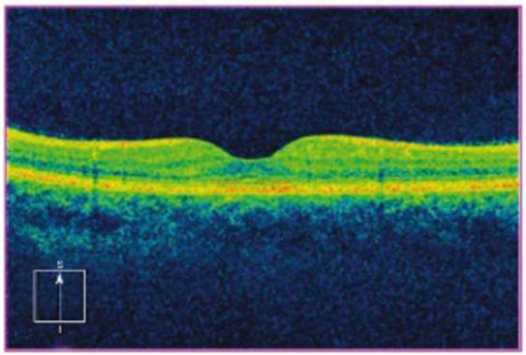
ILM-RPE Thickness (µm)



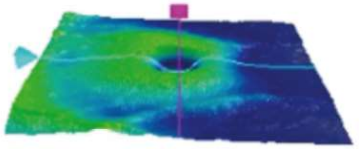
Fovea: 256, 64

High-definition mode

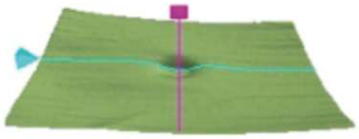




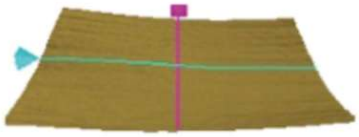
B



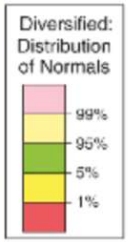
ILM-RPE



ILM



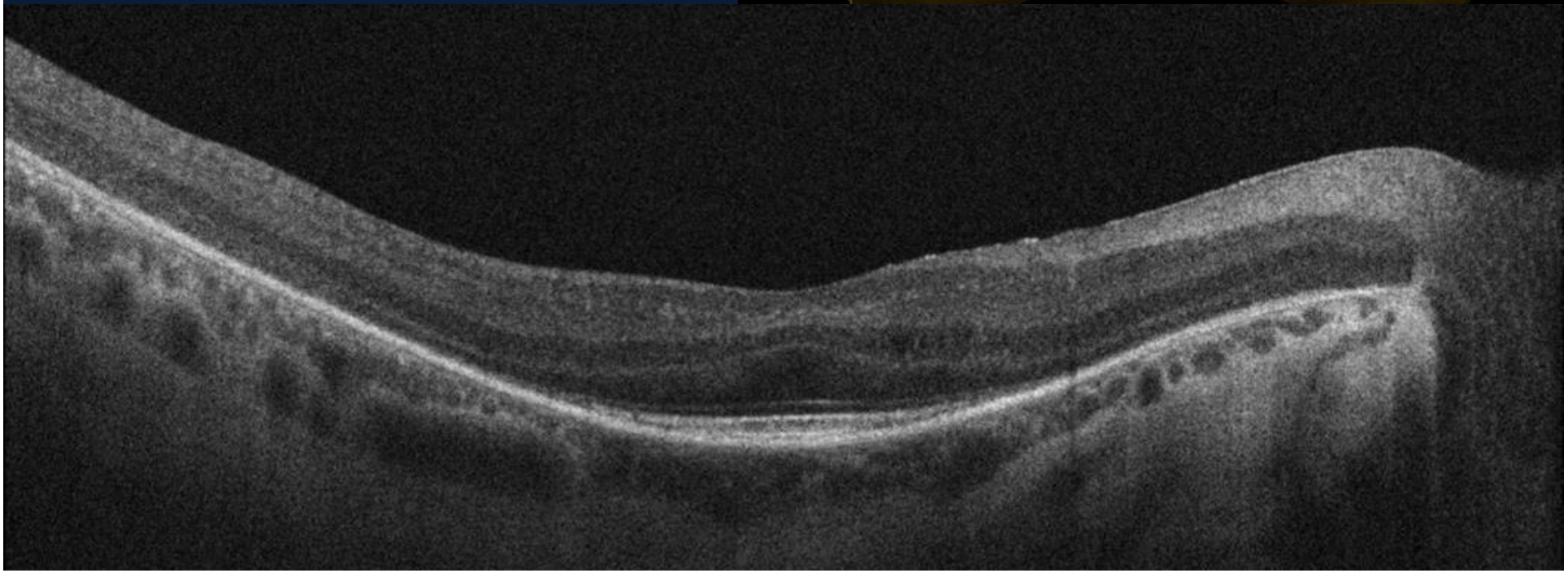
RPE



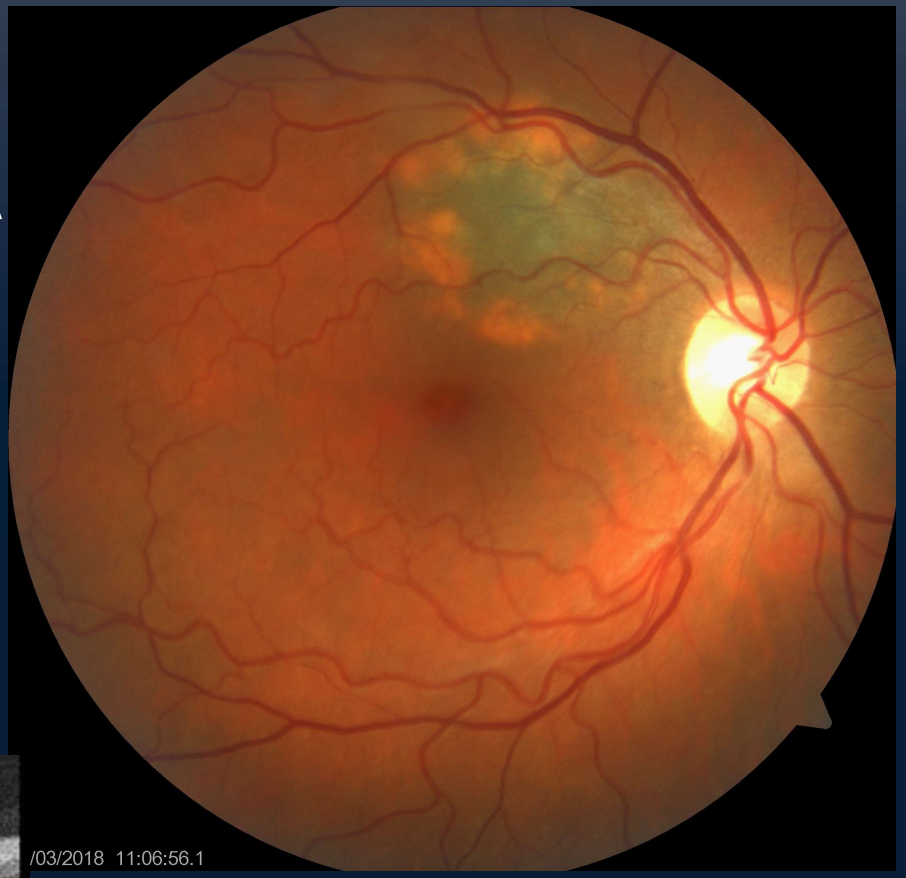
⚠	Central Subfield Thickness (µm)	Cube Volume (mm^3)	Cube Average Thickness (µm)
ILM-RPE	230	9.2	256

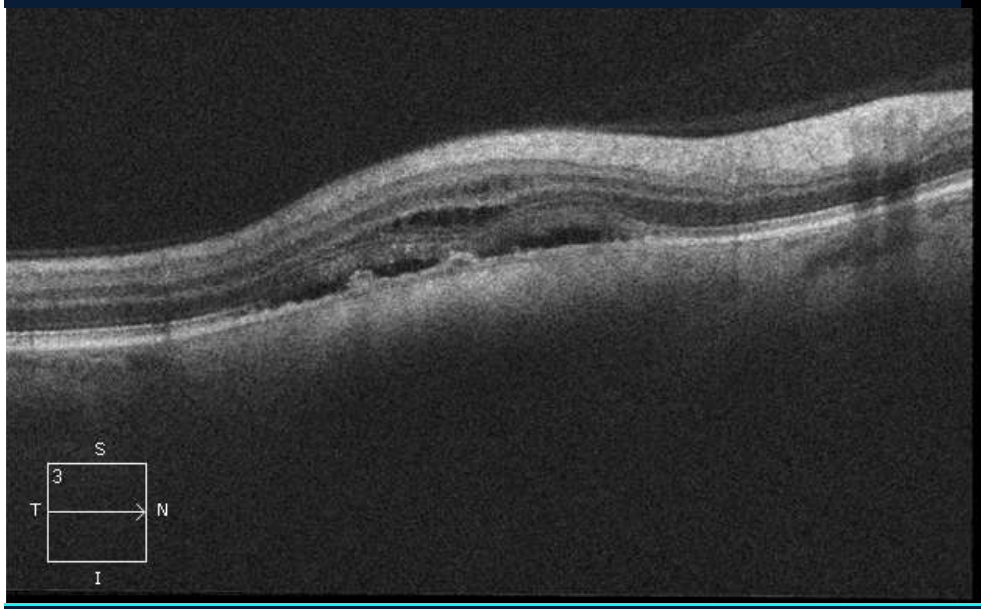
ATLAS OF RETINAL OCT GOLDMAN R ET AL

RETINITIS PIGMENTOSA



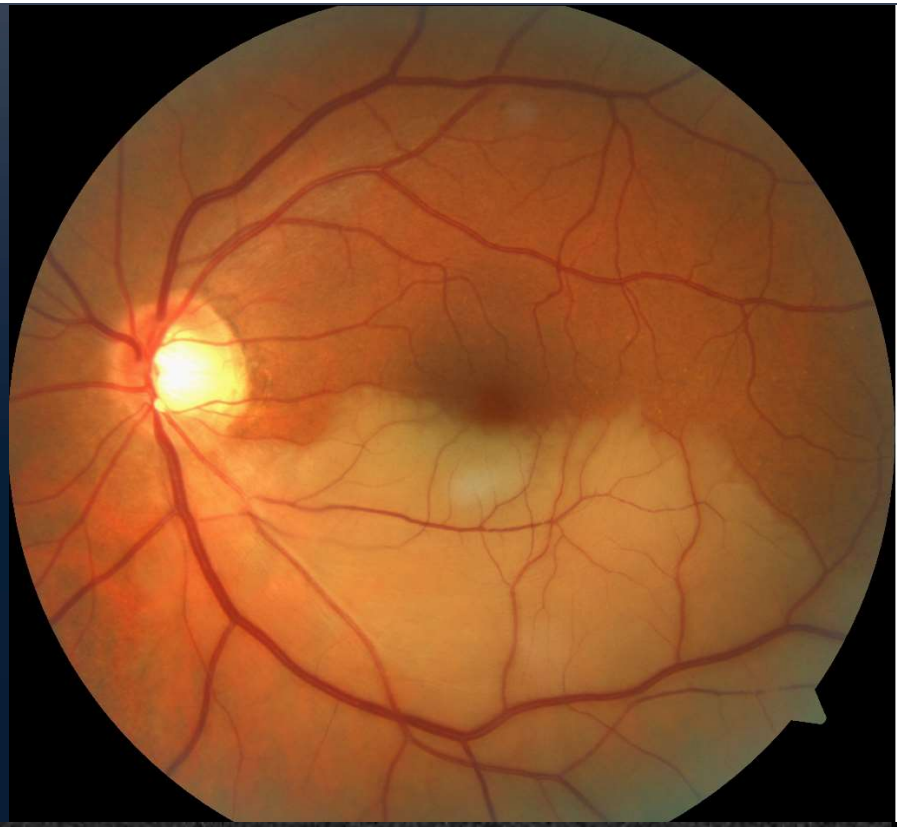
CHOROIDAL MELANOMA



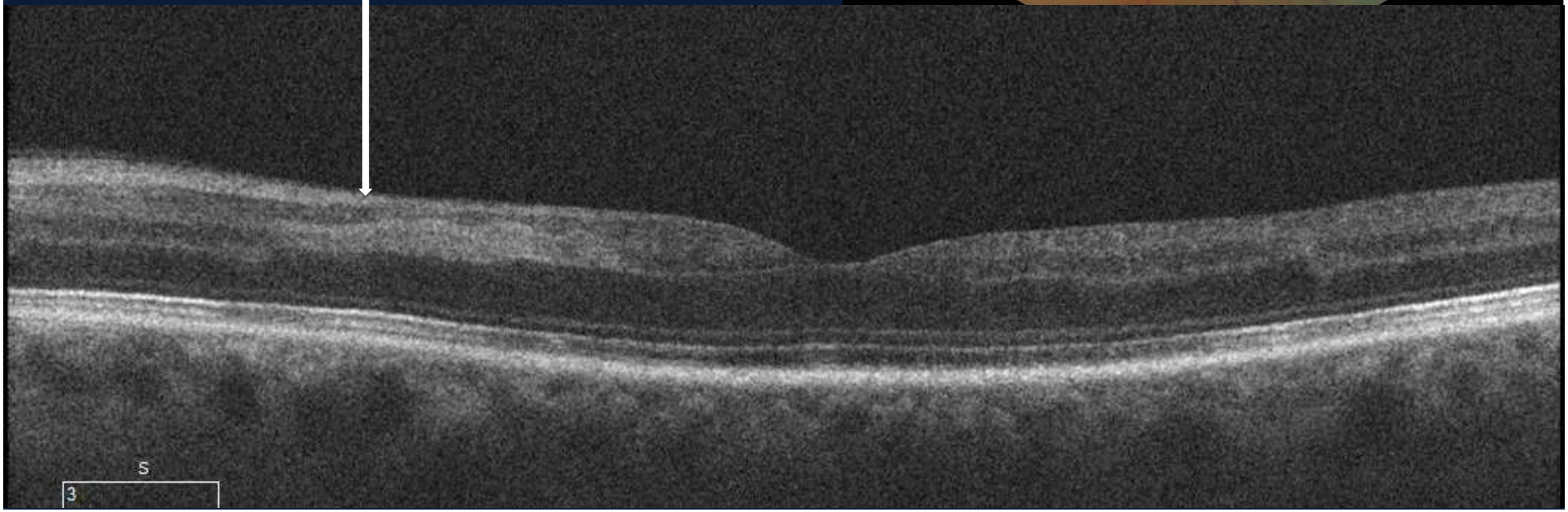


INNER RETINAL ABNORMALITY

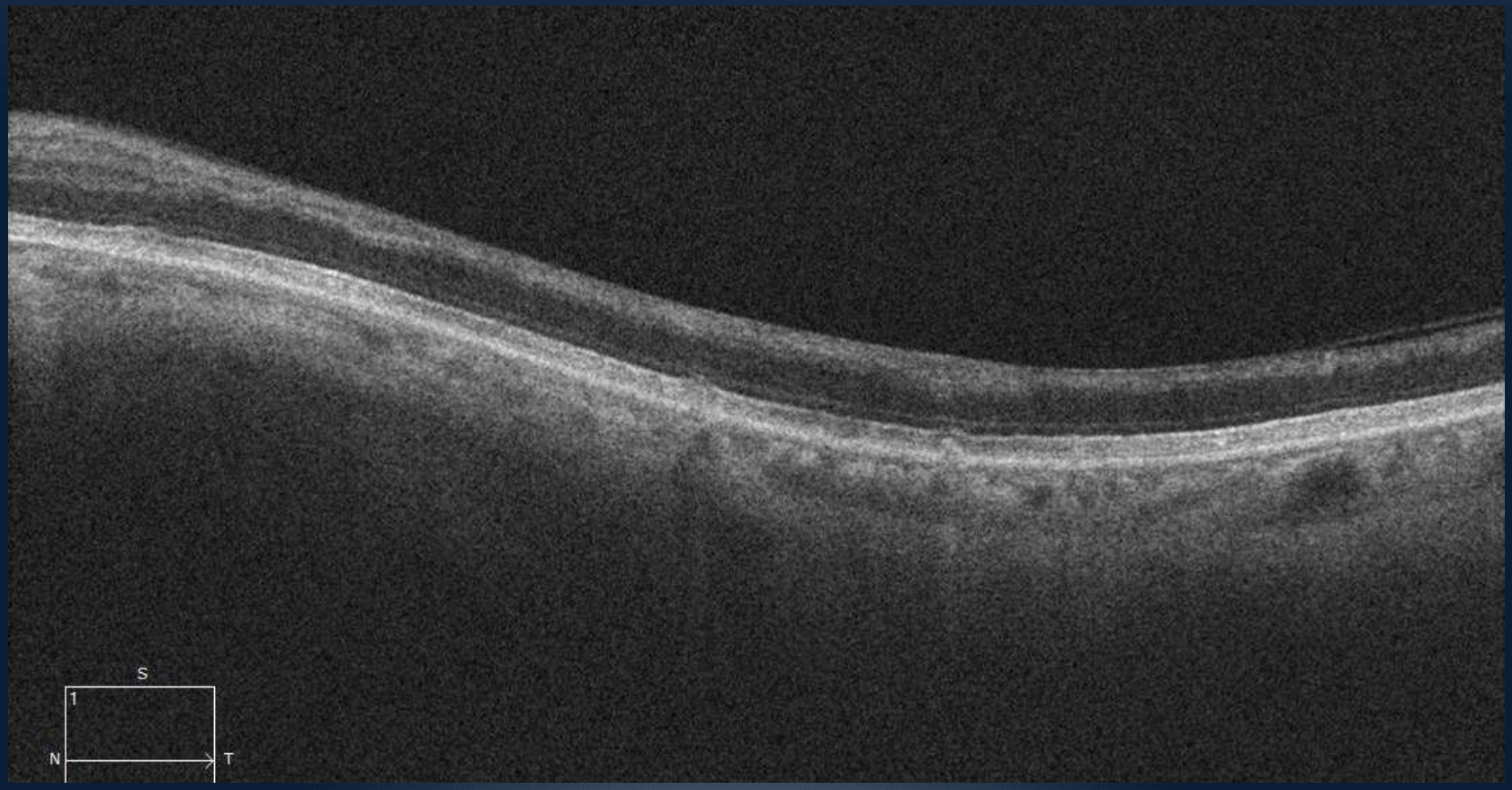
ACUTE RETINAL ARTERY OCCLUSION



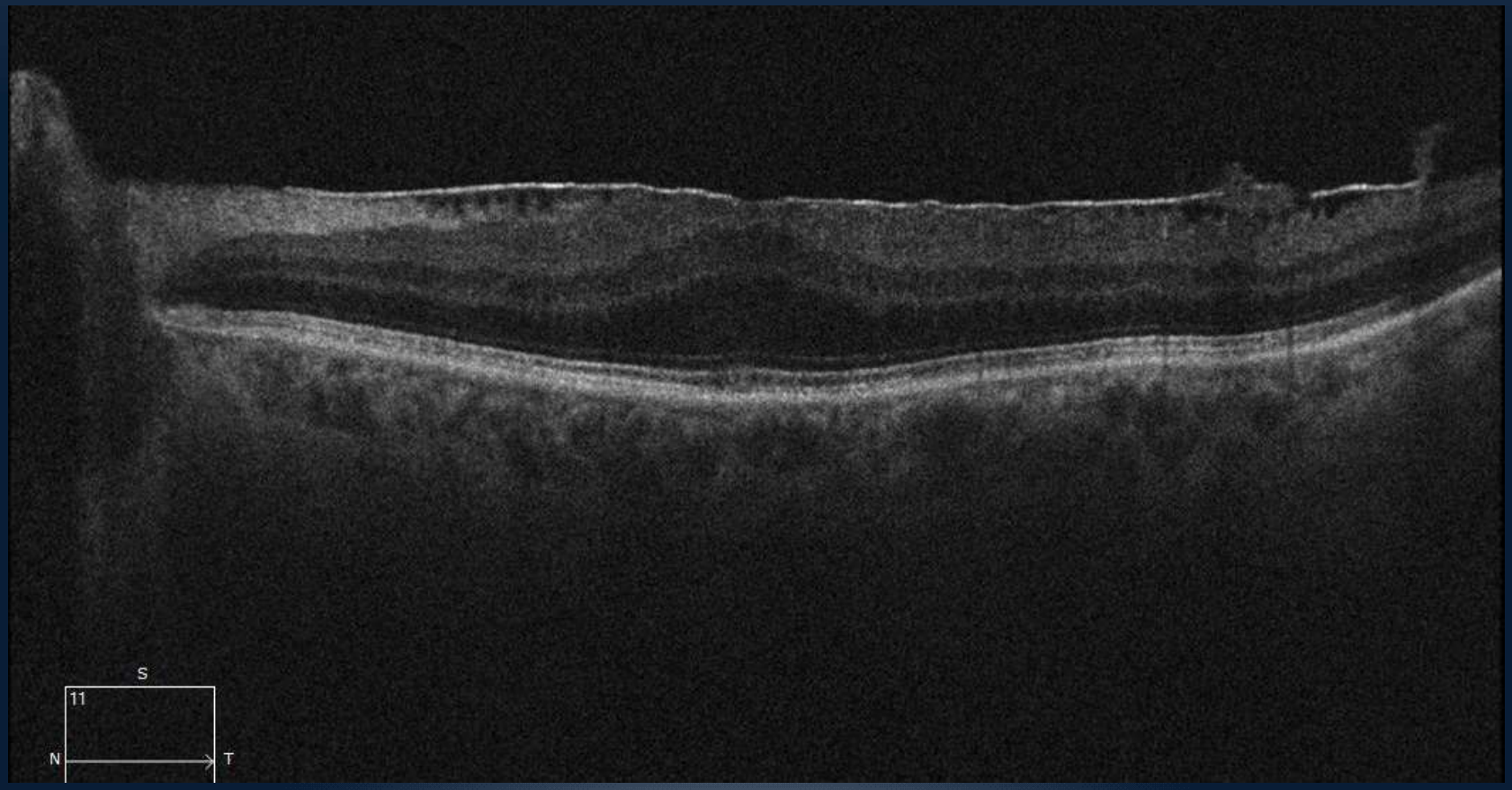
Increased Hyper reflectivity



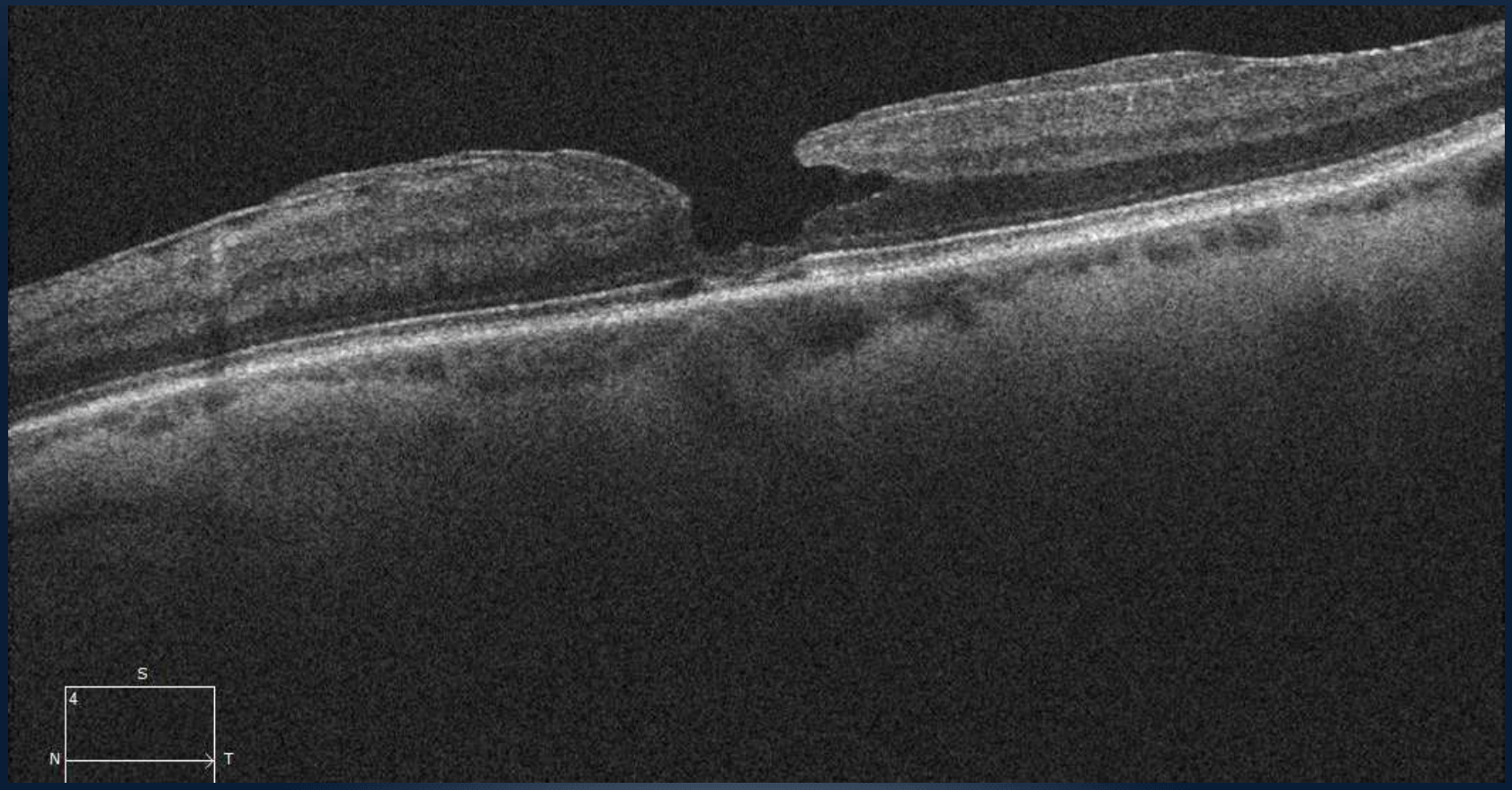
OLD CENTRAL RETINAL ARTERY OCCLUSION



EPIRETINAL MEMBRANE

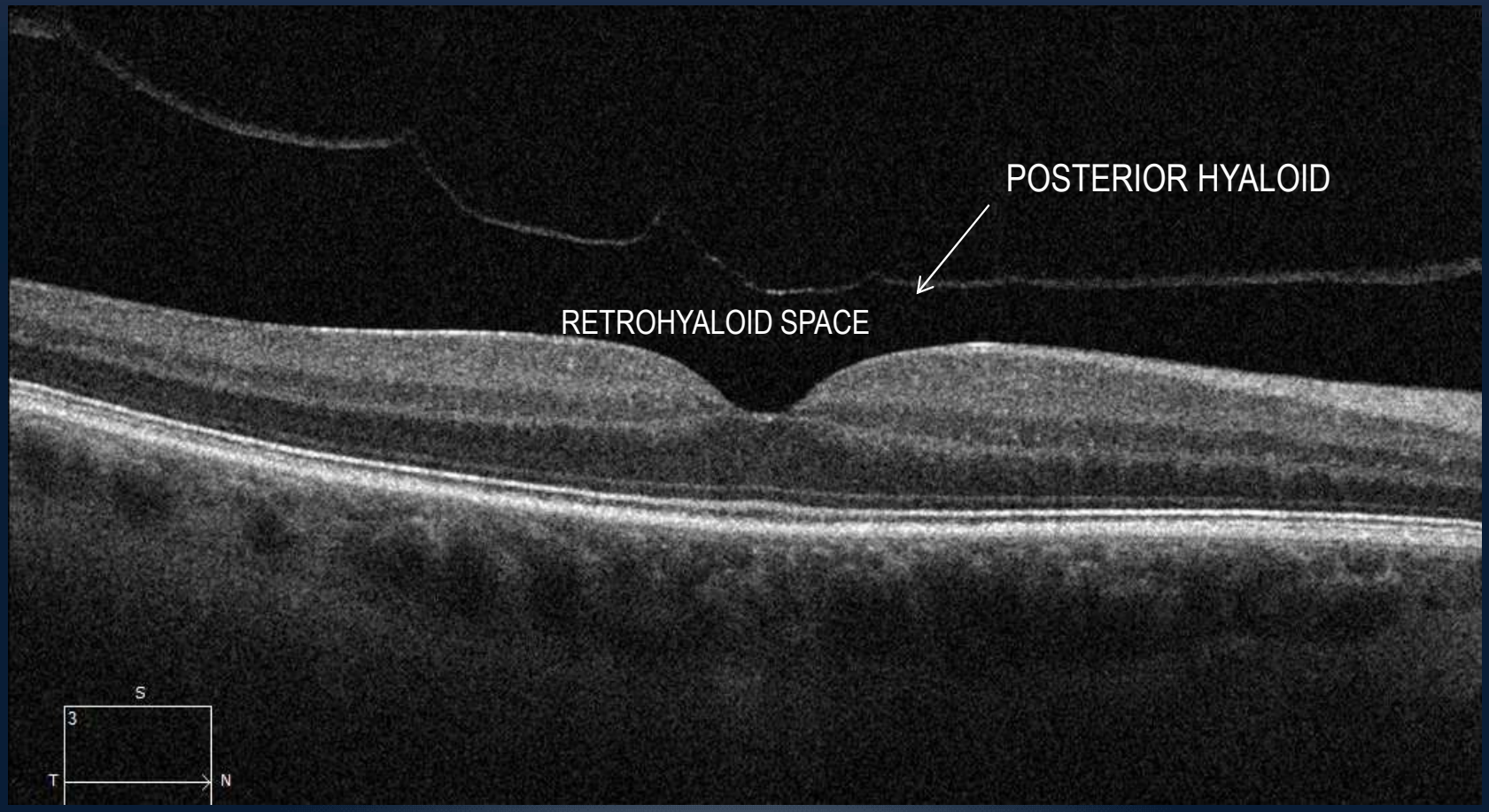


EPIRETINAL MEMBRANE WITH LAMELLAR MACULAR HOLE

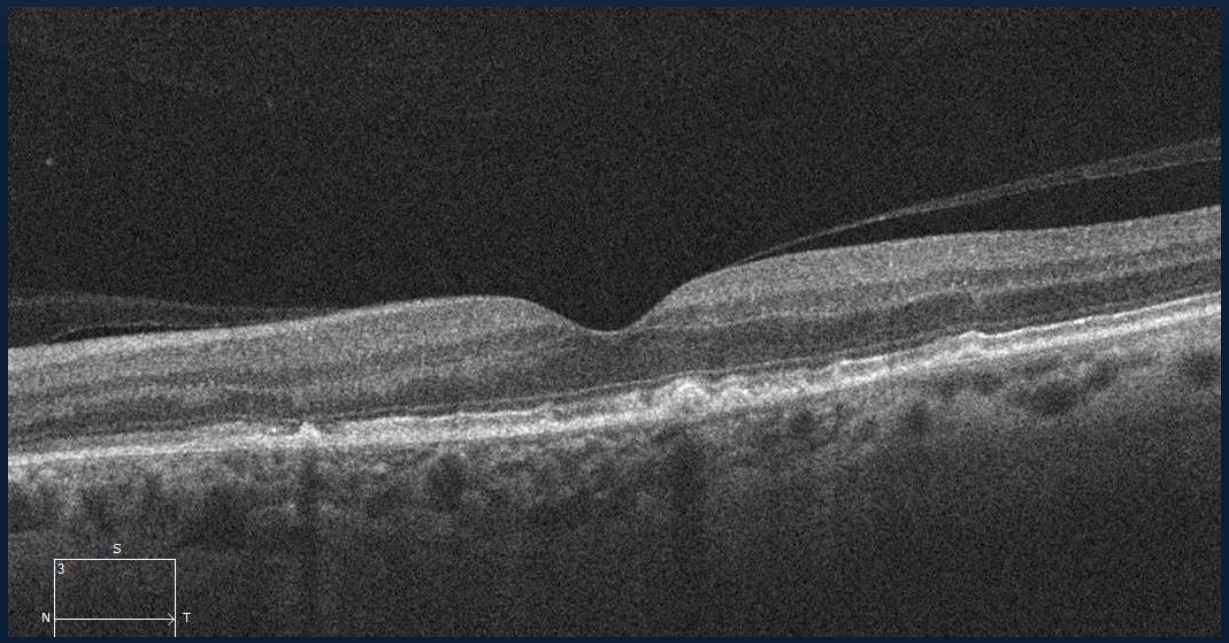


VITREOUS CHANGES

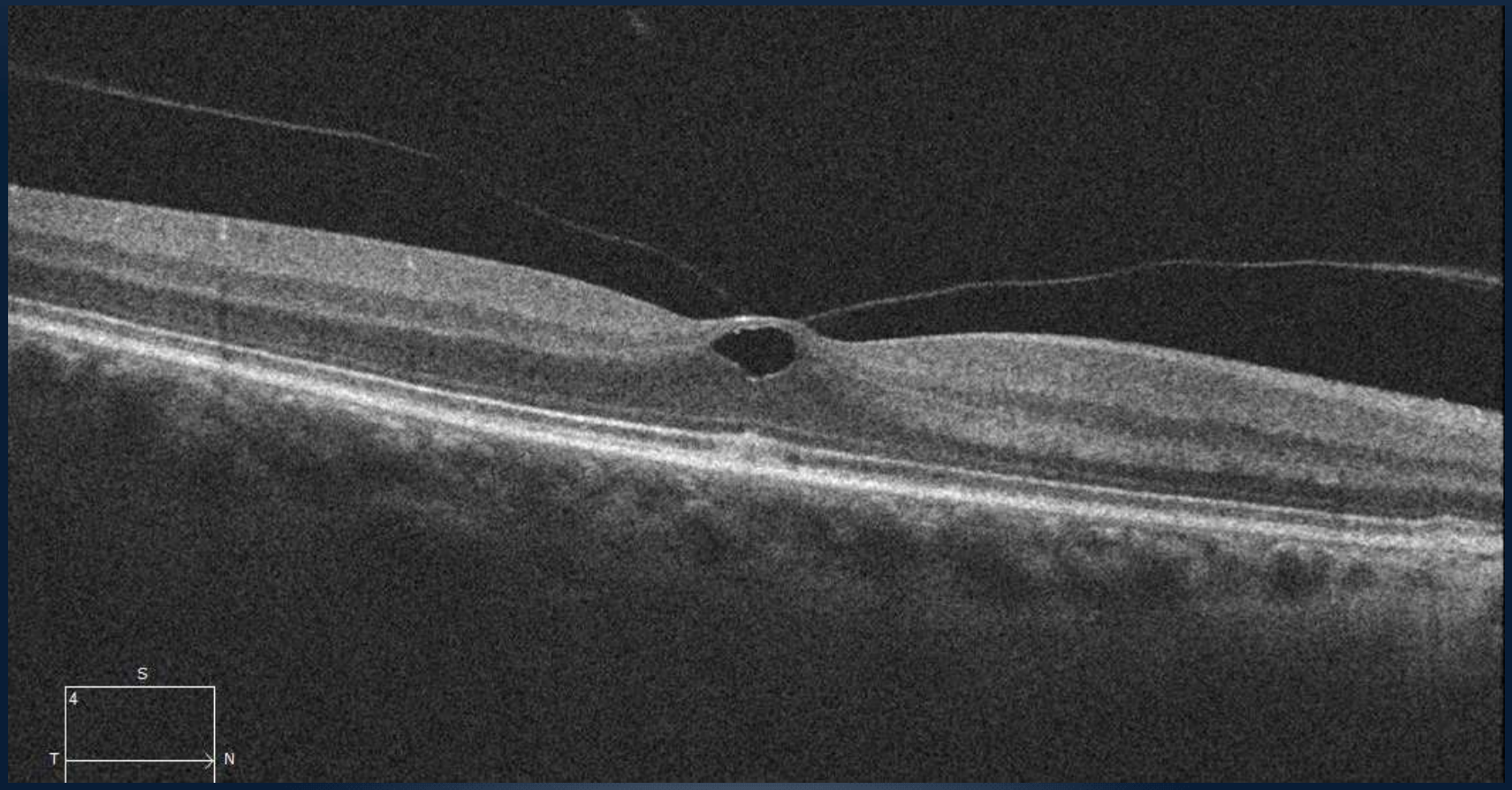
NORMAL VITREOUS



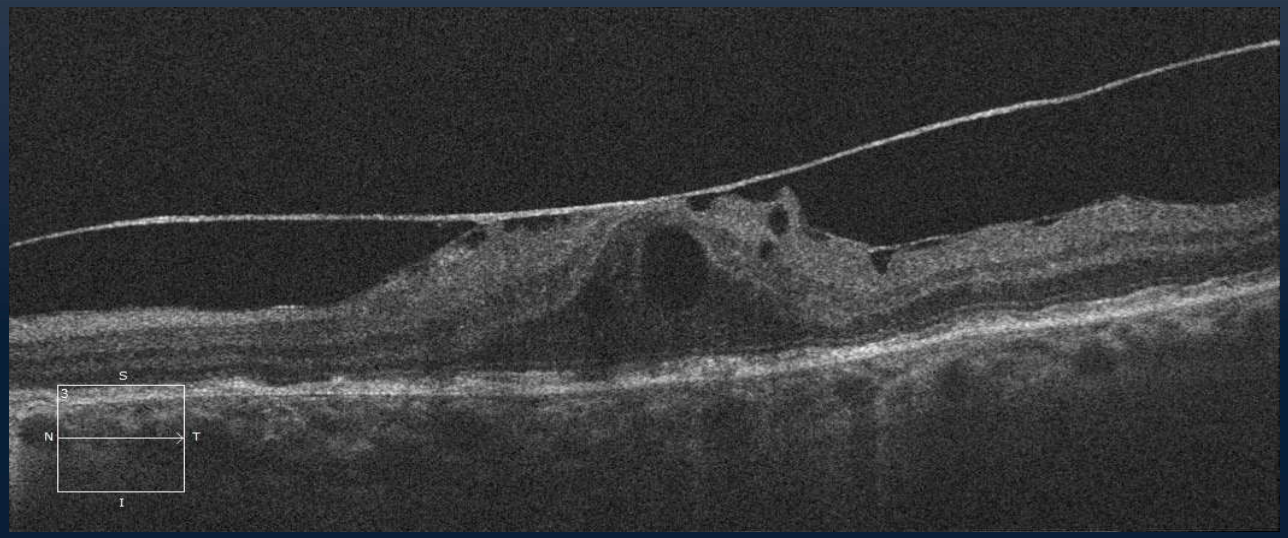
VITREOMACULAR ADHESION AND VITREOMACULAR TRACTION



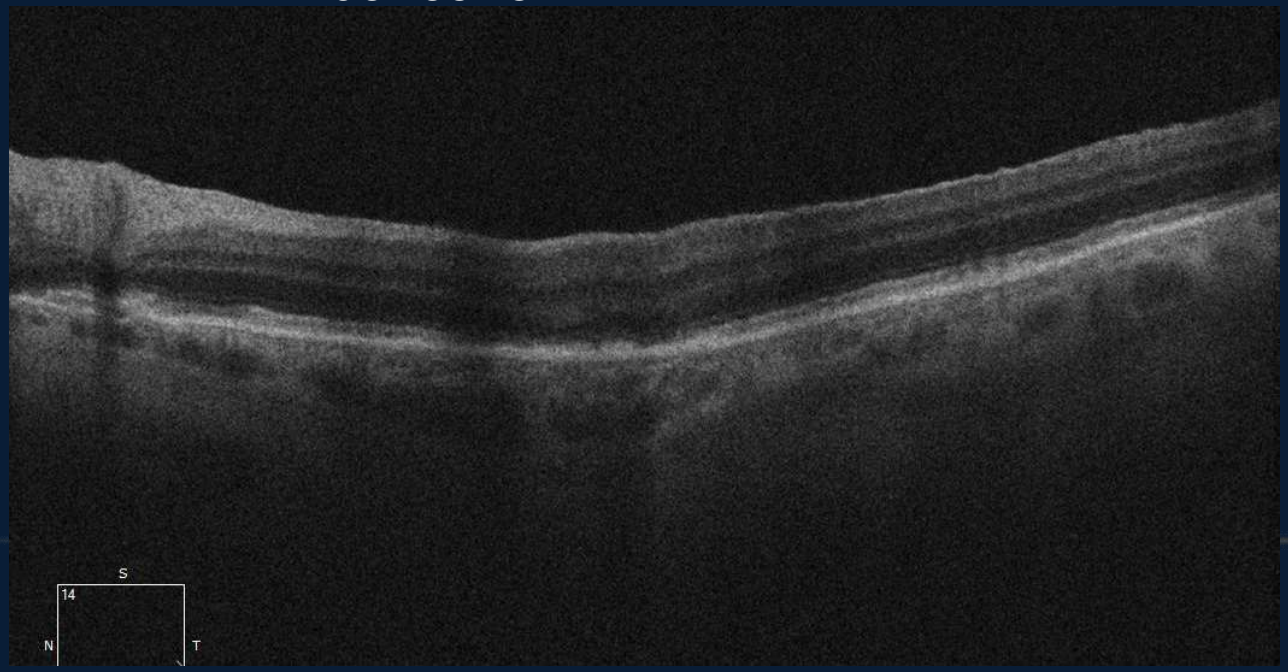
VMT



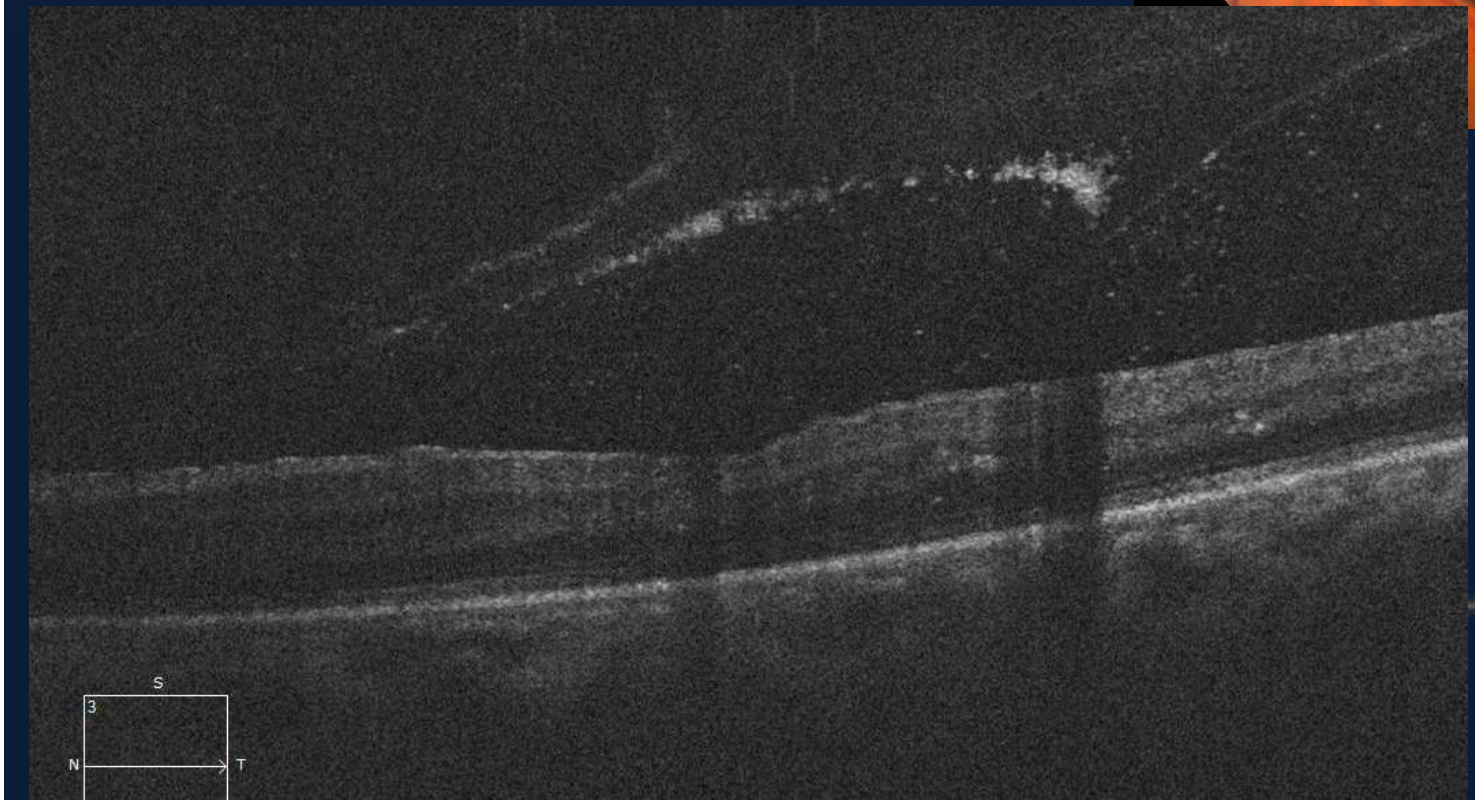
VMT



VMT POST SURGERY

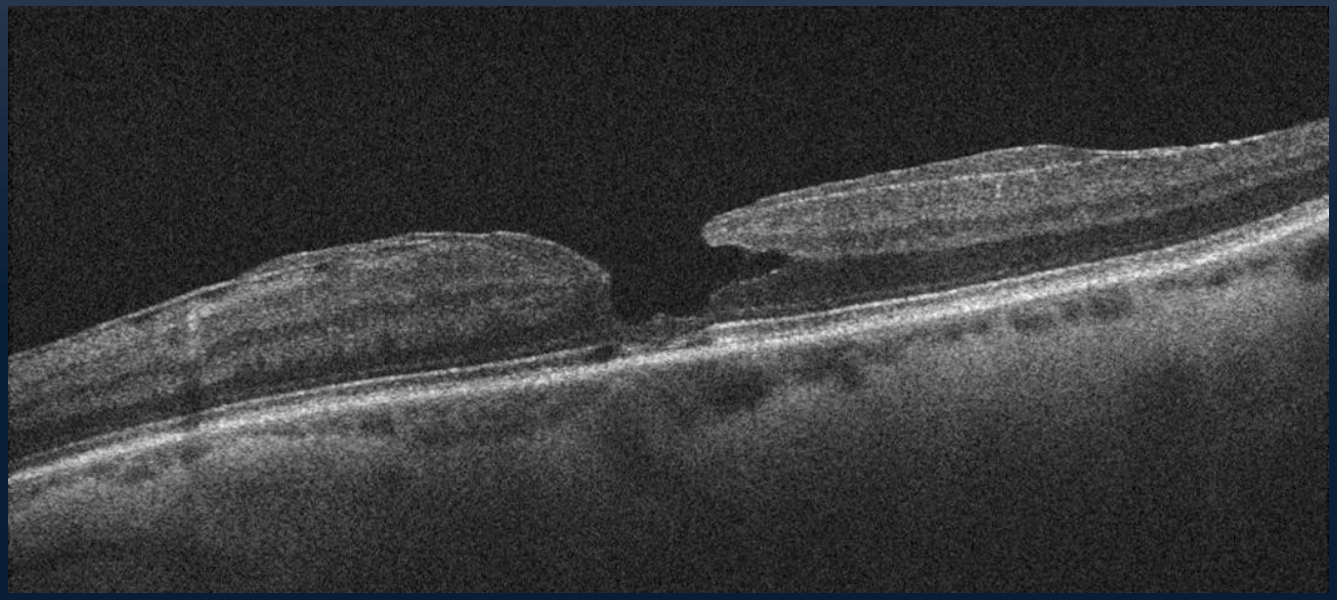


VITREOUS HAEMORRHAGE (PROLIFERATIVE DIABETIC RETINOPATHY)

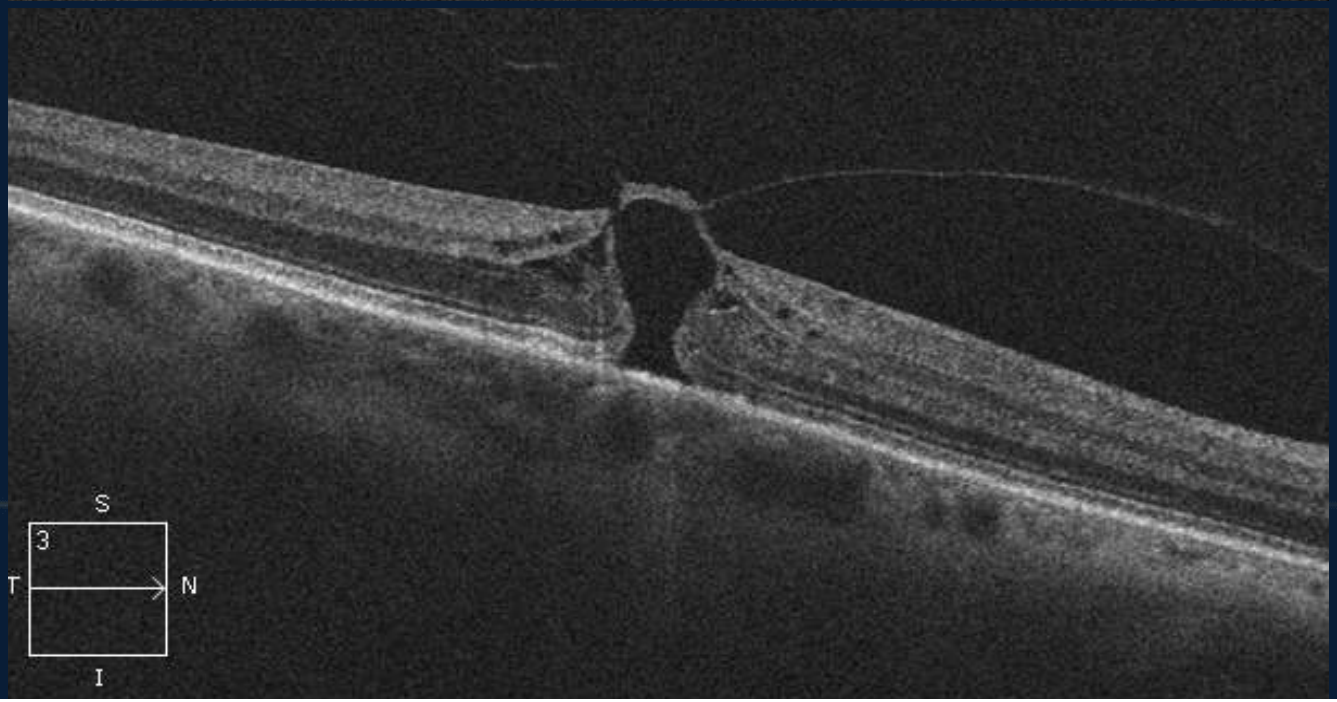


Polling Question 4. You have performed an OCT for symptoms of metamorphopsia. Would you refer patient A or B for an urgent referral?

A



B

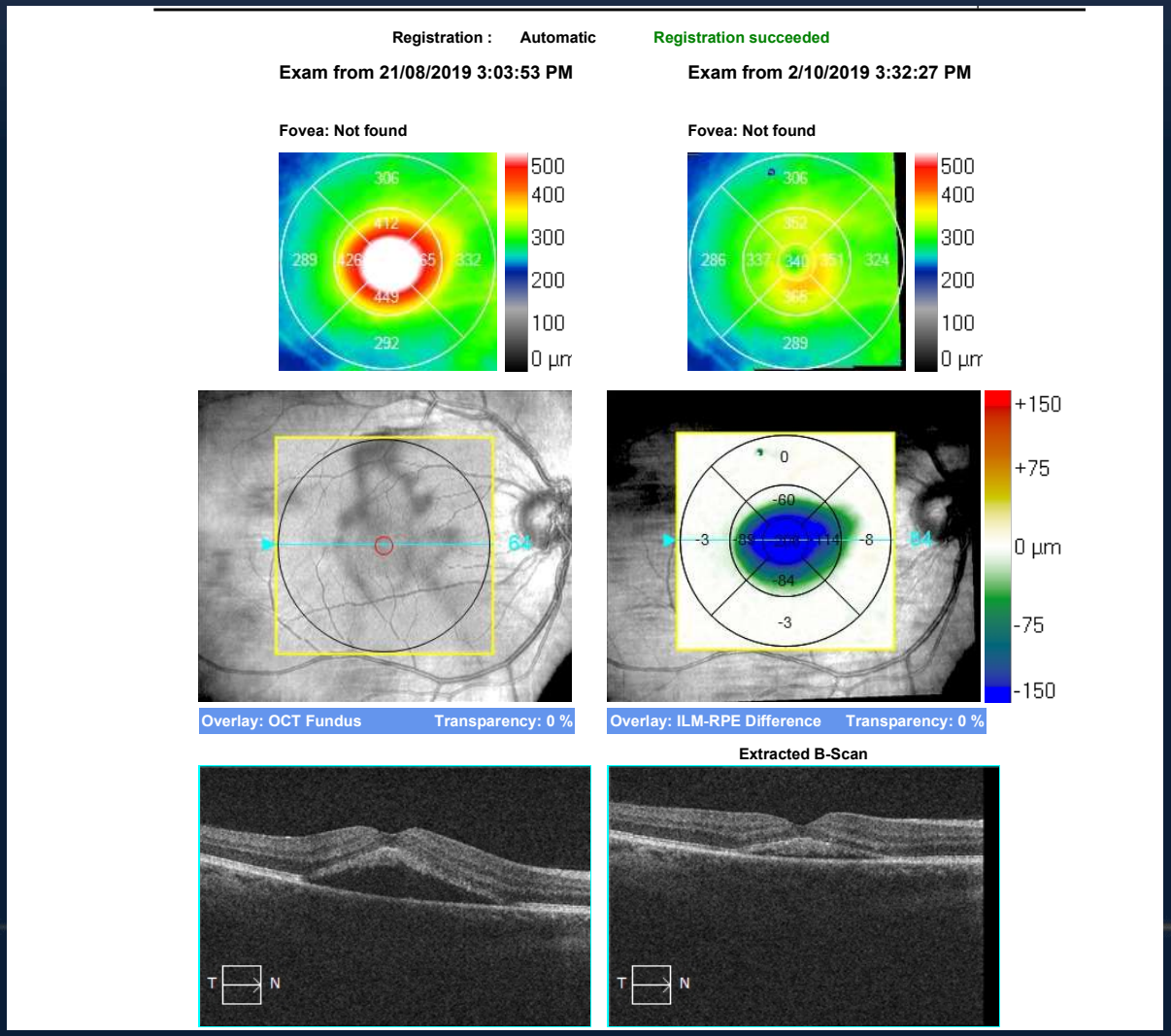


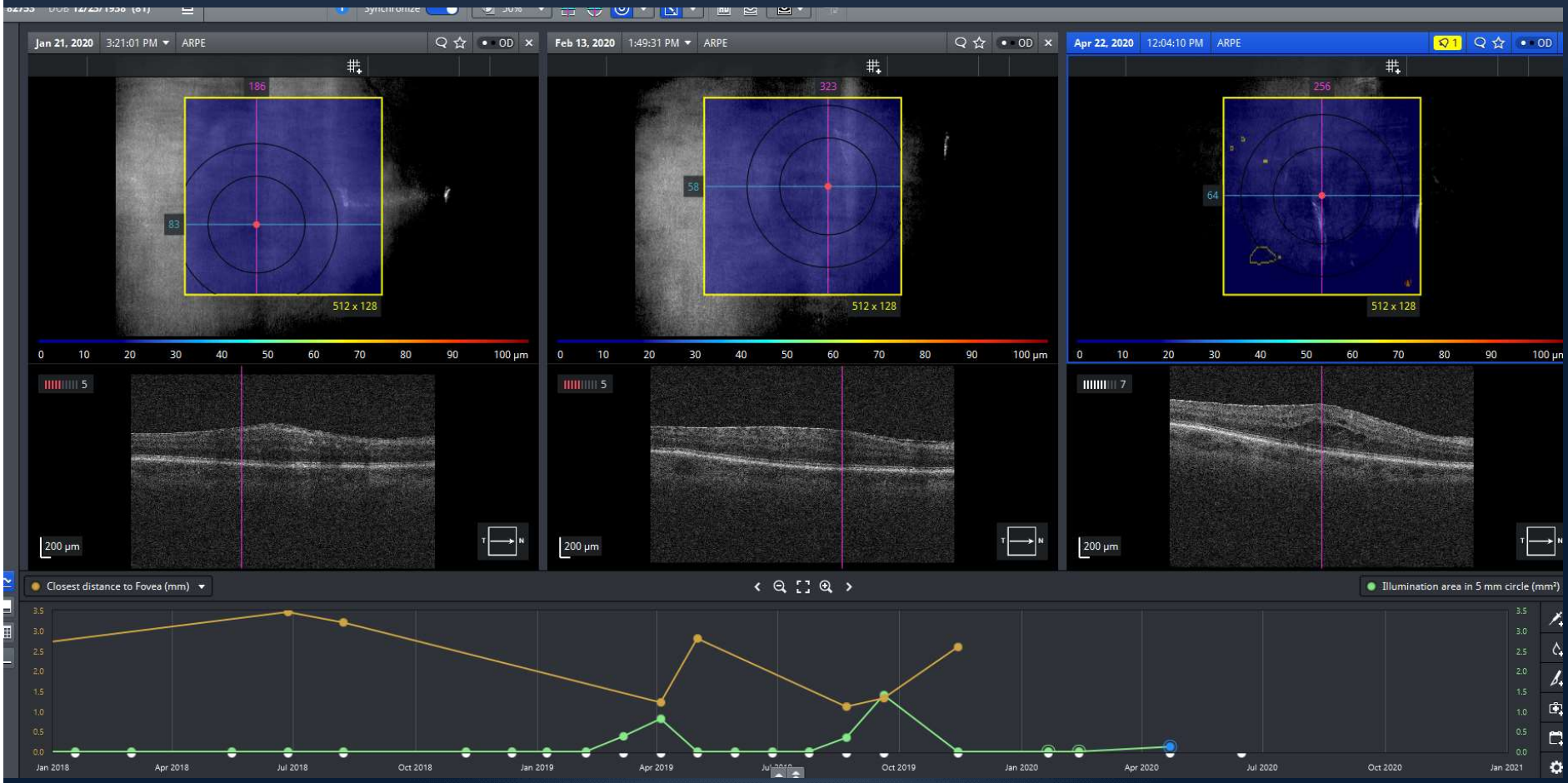
ASSESSMENT OF MACULAR OCT

Basic tips includes

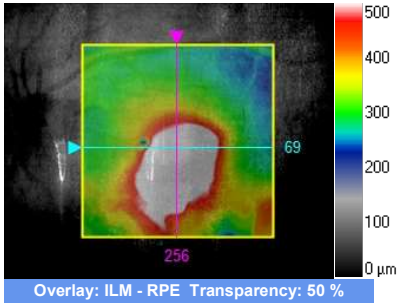
- Pay attention to the scan quality
- Use proper language
- Familiarise with the Anatomy
- Assessment of Subfield analysis

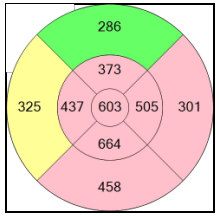
HELPS IN ASSESSING THE OUTCOME OF TREATMENT



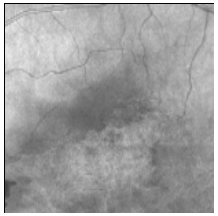

Jan 21, 2020 3:21:01 PM ARPE OD
Feb 13, 2020 1:49:31 PM ARPE OD
Apr 22, 2020 12:04:10 PM ARPE OD
186
83
512 x 128
323
58
512 x 128
256
64
512 x 128
0 10 20 30 40 50 60 70 80 90 100 µm
200 µm
Closest distance to Fovea (mm)
Illumination area in 5 mm circle (mm²)
Jan 2018 Apr 2018 Jul 2018 Oct 2018 Jan 2019 Apr 2019 Oct 2019 Jan 2020 Apr 2020 Jul 2020 Oct 2020 Jan 2021

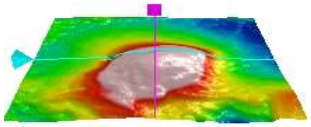
QUANTITATIVE AND QUALITATIVE ANALYSIS

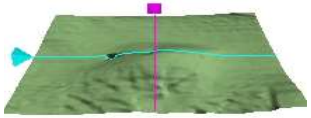


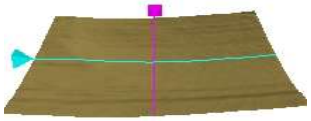


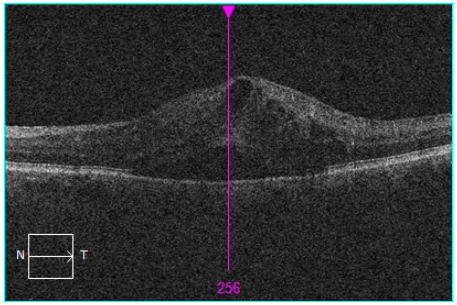
ILM-RPE Thickness (µm)

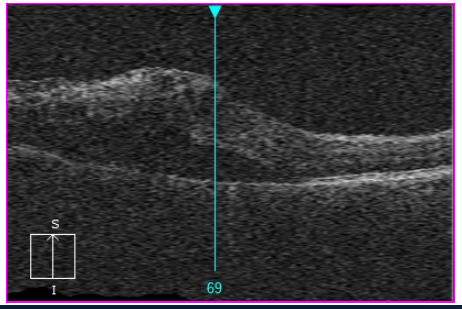

Fovea: Not found

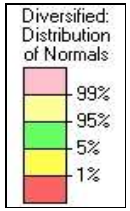

ILM - RPE


ILM


RPE

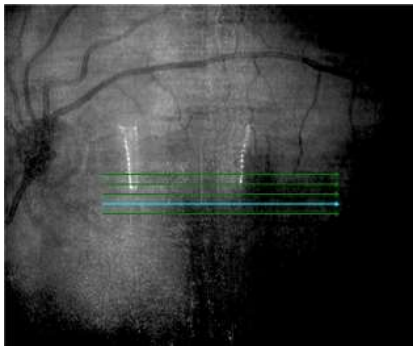


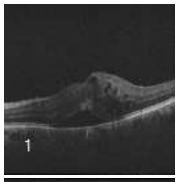


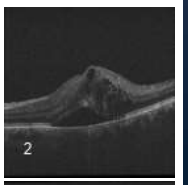


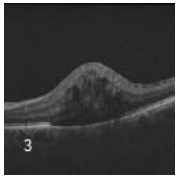
	Central Subfield Thickness	Cube Volume (mm³)	Cube Average Thickness

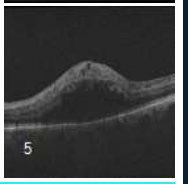
Scan Angle: 0° Spacing: 0.25 mm Length: 6 mm

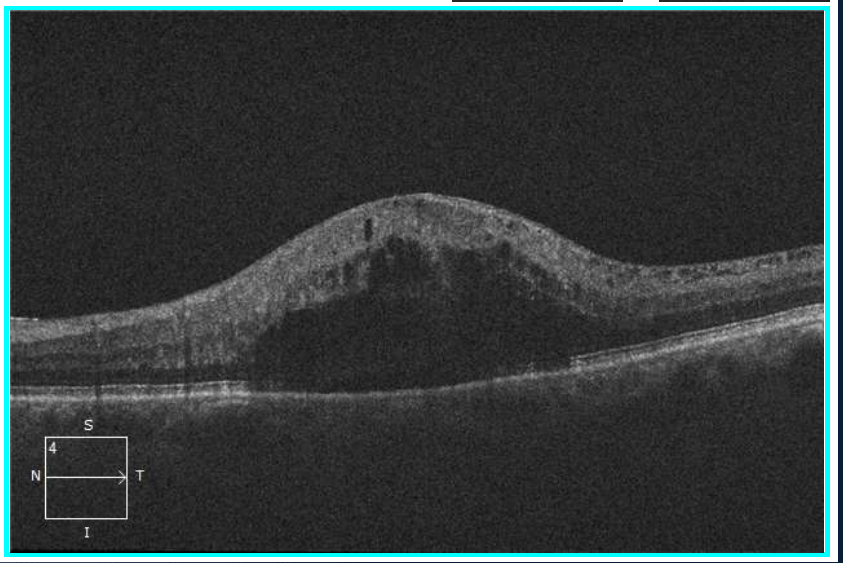












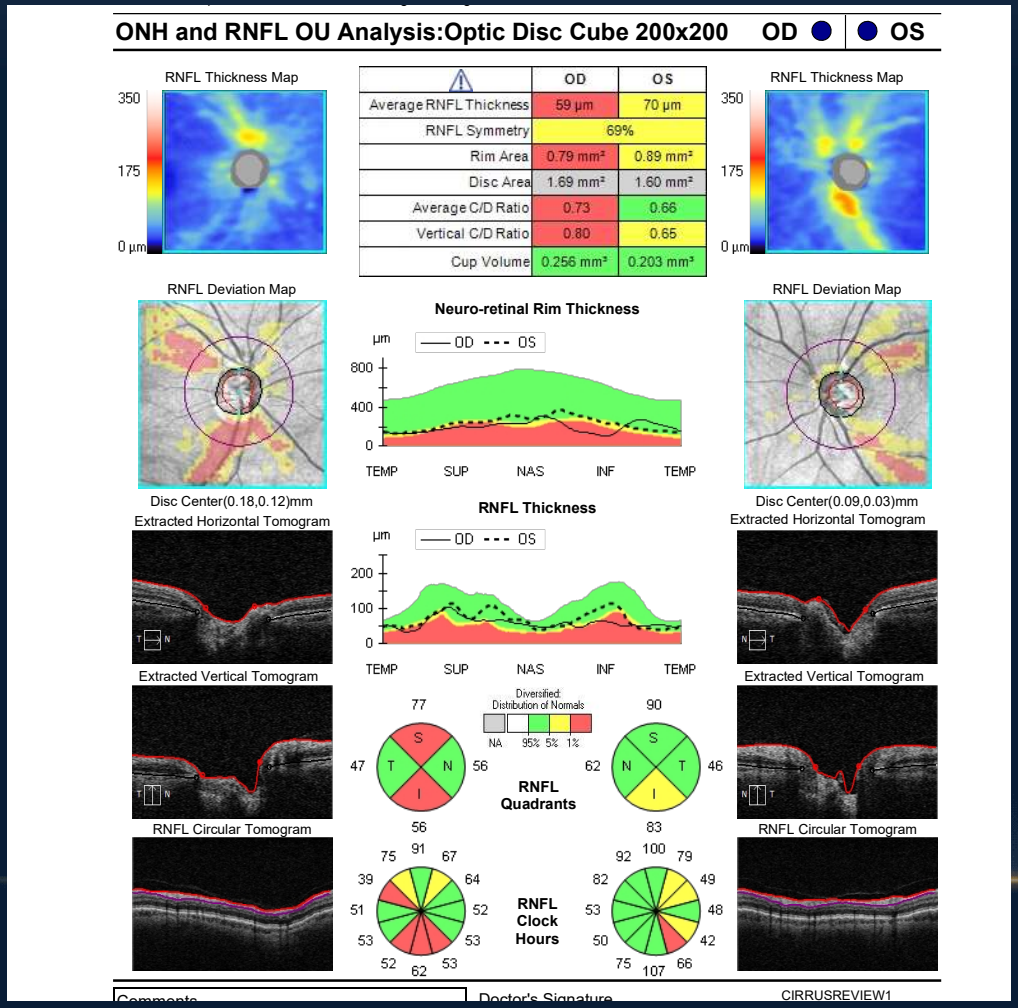
Qualitative analysis –Location of the abnormality, Description of the structure & identify the anomalous structure

Quantitative – Retinal thickness and volume and NFL thickness

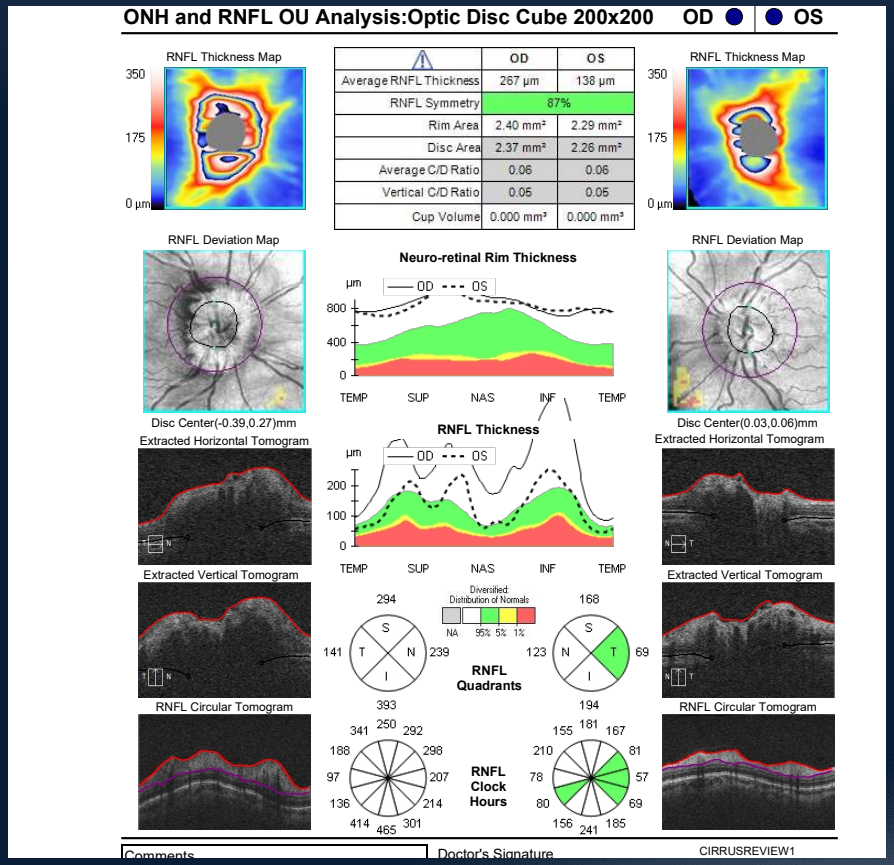
OTHER OCT SCAN USED IN OPHTHALMOLOGY

OCT NFL

OCT OF NFL - GLAUCOMA

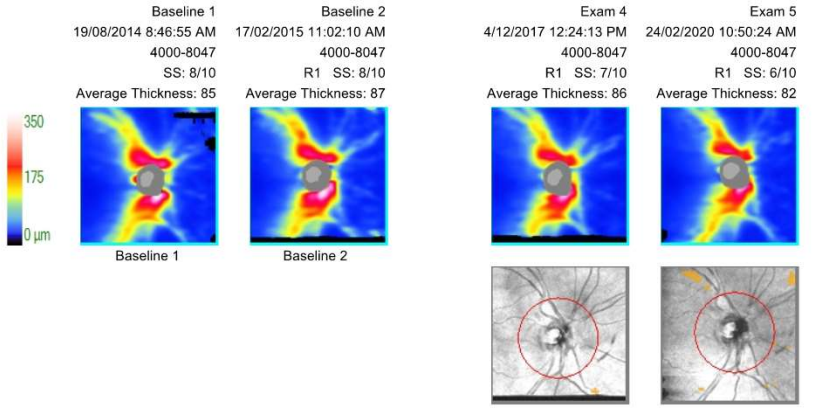


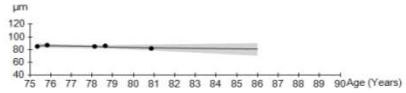
OCT NFL AND PAPILLOEDEMA



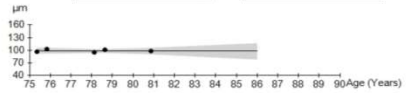
Guided Progression Analysis: (GPA™)

OD ● | ○ OS

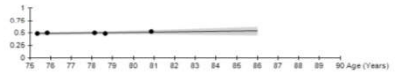




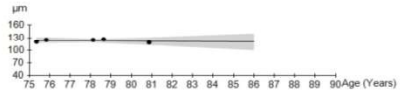
Average RNFL Thickness
Rate of change: -0.55 +/- 1.18 µm/Year



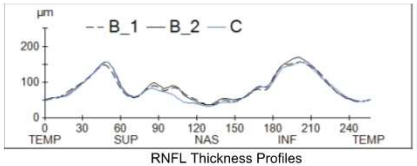
Superior RNFL Thickness
Rate of change: -0.13 +/- 2.28 µm/Year



Average Cup-to-Disc Ratio
Rate of change: 0.00 +/- 0.01 /Year



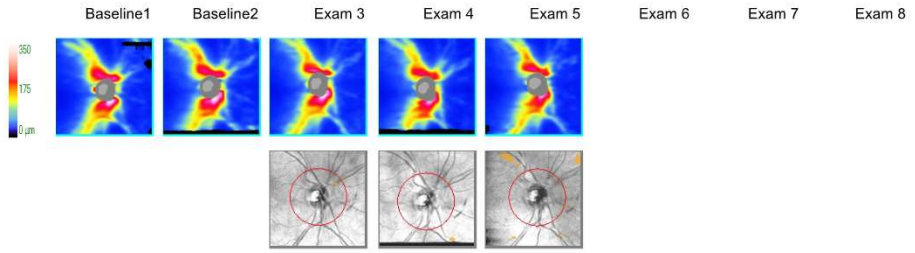
Inferior RNFL Thickness
Rate of change: -0.38 +/- 2.40 µm/Year



RNFL Thickness Profiles

Guided Progression Analysis: (GPA™)

OD ● | ○ OS



RNFL and ONH Summary Parameters

		Exam Date/Time	Serial Number	Registration Method	SS	Avg RNFL Thickness (µm)	Inf Quadrant RNFL (µm)	Sup Quadrant RNFL (µm)	Rim Area (mm^2)	Average Cup-to-Disc Ratio	Vertical Cup-to-Disc Ratio	Cup Volume (mm^3)
Baseline 1:	1	19/08/2014 8:46:55 AM	4000-8047		8/10	85	121	97	1.08	0.49	0.50	0.112
Baseline 2:	2	17/02/2015 11:02:10 AM	4000-8047	R1	8/10	87	125	102	1.10	0.50	0.49	0.122
	3	1/06/2017 3:27:04 PM	4000-8047	R1	7/10	85	125	96	1.12	0.50	0.48	0.129
	4	4/12/2017 12:24:13 PM	4000-8047	R1	7/10	86	126	101	1.21	0.48	0.50	0.127
Current:	5	24/02/2020 10:50:24 AM	4000-8047	R1	6/10	82	119	99	1.13	0.52	0.50	0.149

Registration Methods
R2 - Registration based on translation and rotation of OCT fundus
R1 - Registration based only on translation of disc center

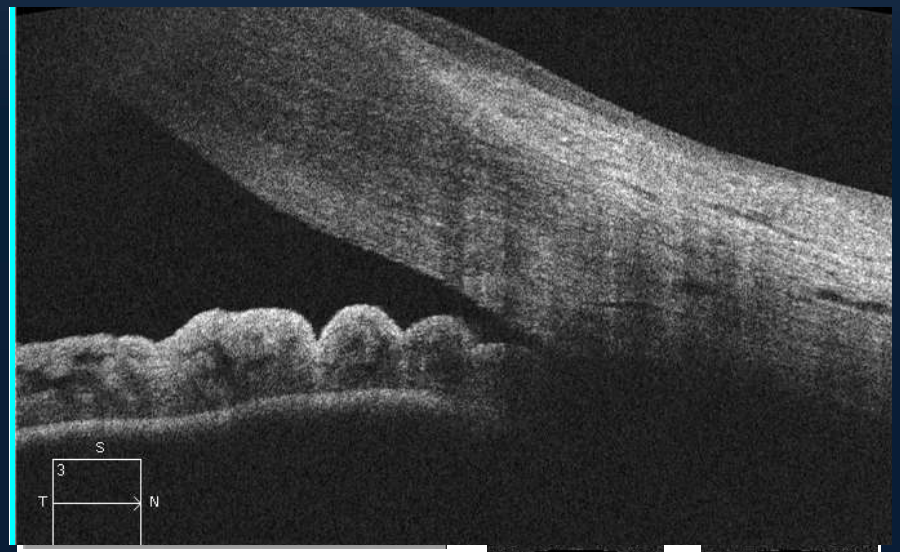
Likely Loss
Possible Loss

Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area the values have decreased. For Cup-to-Disc Ratios and Cup Volume values have increased.

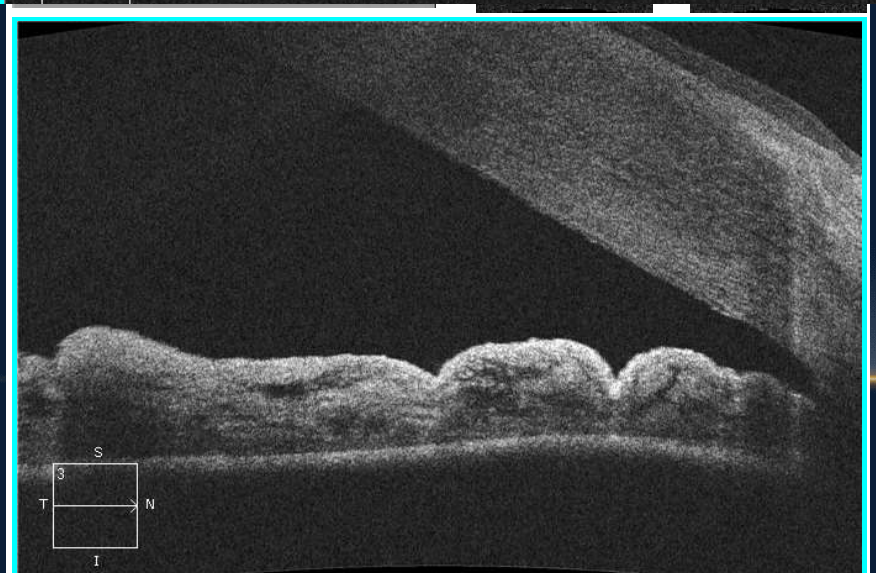
Possible Increase

Compared to baseline, statistically significant increase detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area values have increased. For Cup-to-Disc Ratios and Cup Volume values have decreased.

ANT SEGMENT OCT



PRE PI



POST PI

TAKE HOME MESSAGE

1. OCT should be performed only to aid diagnosis and it does not replace history and thorough clinical examination
2. Good quality OCT Scan is essential
3. Appropriate referral is based on the clinical diagnosis and OCT